History and Slides – 2024 April no 4

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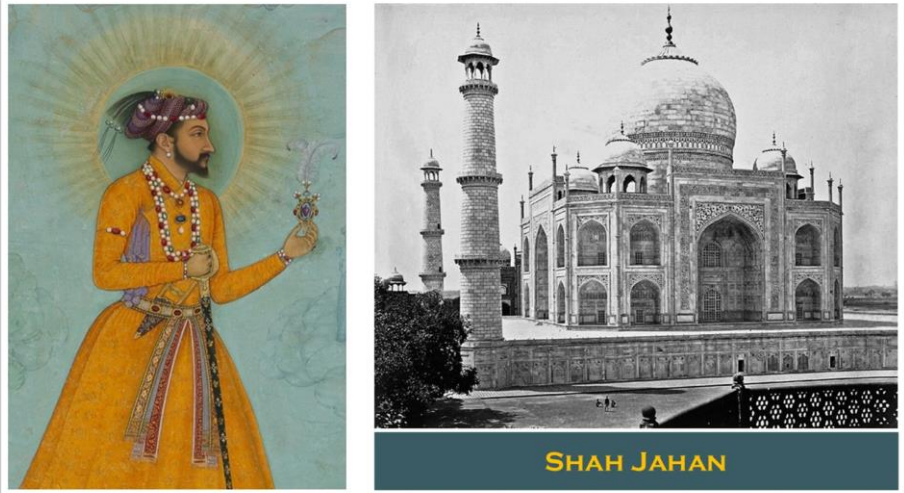
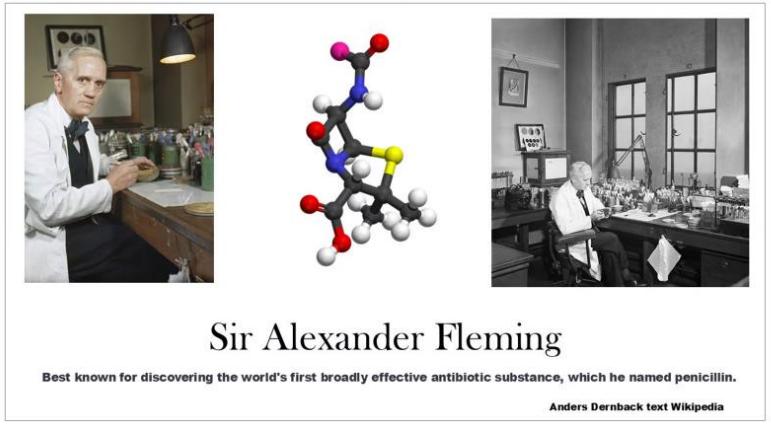
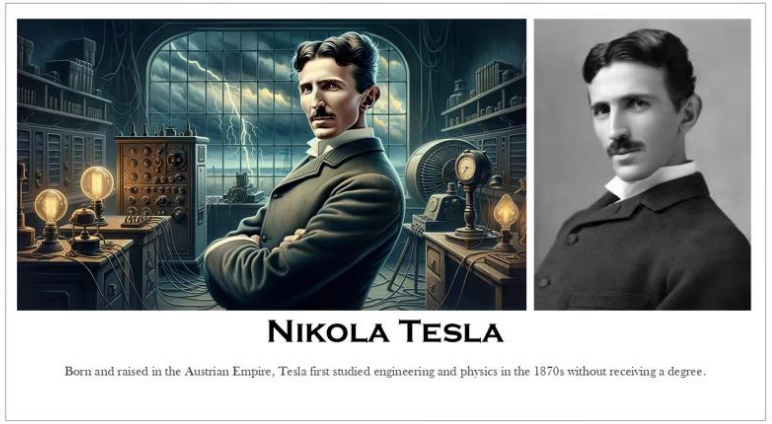
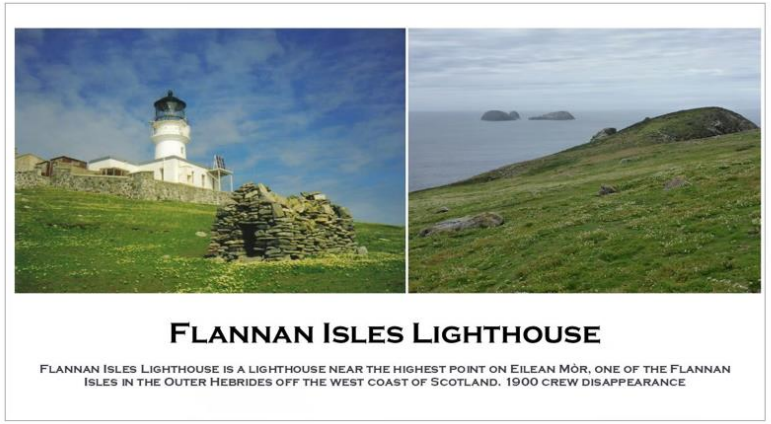
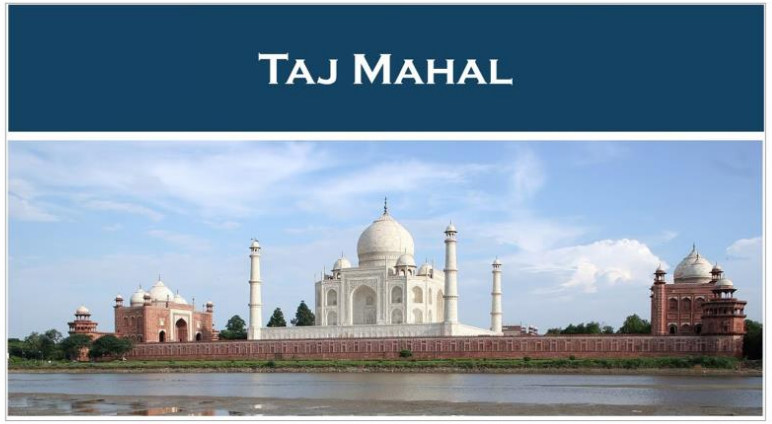



Sir Alexander Fleming
Best known for discovering the world's first broadly effective antibiotic substance, which he named penicillin.
Anders Dernback text Wikipedia


Nikola Tesla
Born and raised in the Austrian Empire, Tesla first studied engineering and physics in the 1870s without receiving a degree.


Flannan Isles Lighthouse
Flannan Isles Lighthouse is a lighthouse near the highest point on Eilean Mòr, one of the Flannan Isles in the Outer Hebrides off the west coast of Scotland. 1900 crew disappearance



Shah Jahan

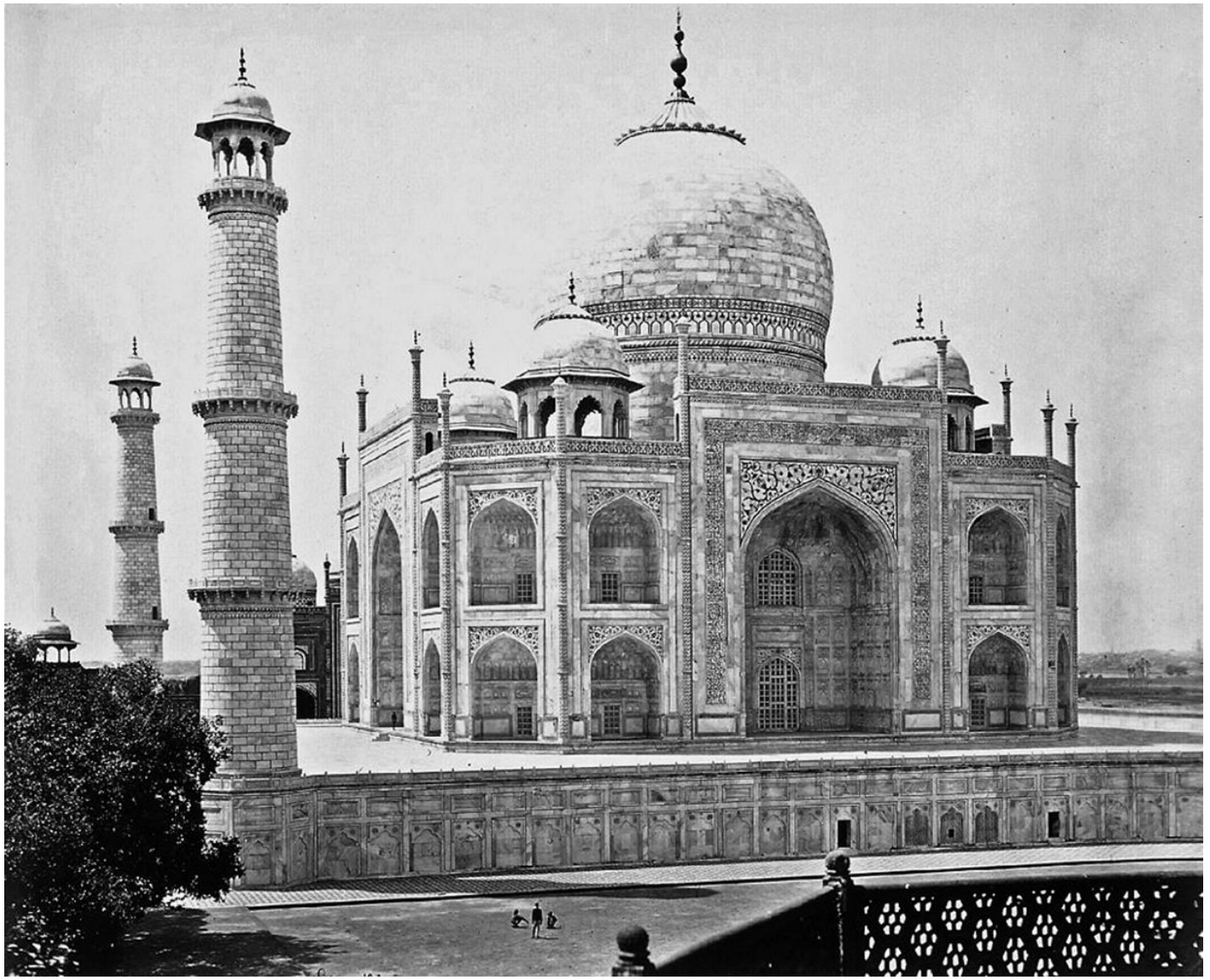
Sir Alexander Fleming

Flannan Isles Lighthouse

Nikola Tesla

Taj Mahal

Never stop learning



Shah Jahan

Shah Jahan

Mirza Shahab-ud-Din Muhammad Khurram (5 January 1592 – 22 January 1666), commonly called Shah Jahan I 'King of the World'), also called Shah Jahan the Magnificent, was Emperor of Hindustan from 1628 until his deposition in 1658. As the fifth Mughal emperor, his reign marked the zenith of Mughal architectural and cultural achievements.

The third son of Jahangir (r. 1605–1627), Shah Jahan participated in the military campaigns against the Sisodia Rajputs of Mewar and the rebel Lodi nobles of the Deccan. After Jahangir's death in October 1627, Shah Jahan defeated his youngest brother Shahryar Mirza and crowned himself emperor in the Agra Fort.

In addition to Shahryar, Shah Jahan executed most of his rival claimants to the throne. He commissioned many monuments, including the Red Fort, Shah Jahan Mosque and the Taj Mahal, where his favorite consort Mumtaz Mahal is entombed. In foreign affairs, Shah Jahan presided over the aggressive campaigns against the Deccan sultanates, the conflicts with the Portuguese, and the wars with the Safavids. He also suppressed several local rebellions and dealt with the devastating Deccan famine of 1630–32.

In September 1657, Shah Jahan was ailing and appointed his eldest son Dara Shikoh as his successor. This nomination led to a succession crisis among his three sons, from which Shah Jahan's third son Aurangzeb (r. 1658–1707) emerged victorious and became the sixth emperor, executing all of his surviving brothers, including Crown Prince Dara Shikoh.

Shah Jahan

After Shah Jahan recovered from his illness in July 1658, Aurangzeb imprisoned him in Agra Fort from July 1658 until his death in January 1666. He was laid to rest next to his wife in the Taj Mahal. His reign is known for doing away with the liberal policies initiated by his grandfather Akbar. During Shah Jahan's time, Islamic revivalist movements like the Naqshbandi began to shape Mughal policies.

Abu'l-Fath Jalal-ud-din Muhammad Akbar (15 October 1542 – 27 October 1605), popularly known as Akbar the Great, and also as Akbar I (Persian pronunciation:, was the third Mughal emperor, who reigned from 1556 to 1605. Akbar succeeded his father, Humayun, under a regent, Bairam Khan, who helped the young emperor expand and consolidate Mughal domains in the Indian subcontinent. He is generally considered one of the greatest emperors in Indian history and led a successful campaign to unify the various kingdoms of Hindūstān or India proper.[

Shah Jahan

He was born on 5 January 1592 in Lahore, present-day Pakistan, as the ninth child and third son of Prince Salim (later known as 'Jahangir' upon his accession) by his wife, Jagat Gosain. The name Khurram (Persian: خرم, lit. 'joyous') was chosen for the young prince by his grandfather, Emperor Akbar, with whom the young prince shared a close relationship. Jahangir stated that Akbar was very fond of Khurram and had often told him "There is no comparison between him and your other sons. I consider him my true son.

When Khurram was born, Akbar considering him to be auspicious insisted the prince be raised in his household rather than Salim's and was thus entrusted to the care of Ruqaiya Sultan Begum. Ruqaiya assumed the primary responsibility for raising Khurram and is noted to have raised Khurram affectionately. Jahangir noted in his memoirs that Ruqaiya had loved his son, Khurram, "a thousand times more than if he had been her own [son].

Jahangir weighing young Prince Khurram by Manohar Das c.1610-1615

Shah Jahan

However, after the death of his grandfather Akbar in 1605, he returned to the care of his mother, Jagat Gosain whom he cared for and loved immensely. Although separated from her at birth, he had become devoted to her and had her addressed as Hazrat in court chronicles. On the death of Jagat Gosain in Akbarabad on 8 April 1619, he is recorded to be inconsolable by Jahangir and mourned for 21 days. For these three weeks of the mourning period, he attended no public meetings and subsisted on simple vegetarian meals. His consort Mumtaz Mahal personally supervised the distribution of food to the poor during this period. She led the recitation of the Quran every morning and gave her husband many lessons on the substance of life and death and begged him not to grieve.

Education

As a child, Khurram received a broad education befitting his status as a Mughal prince, which included martial training and exposure to a wide variety of cultural arts, such as poetry and music, most of which was inculcated, according to court chroniclers, by Jahangir. According to his chronicler Qazvini, prince Khurram was only familiar with a few Turki words and showed little interest in the study of the language as a child. Khurram was attracted to Hindi literature since his childhood, and his Hindi letters were mentioned in his father's biography, Tuzuk-e-Jahangiri.

In 1605, as Akbar lay on his deathbed, Khurram, who at this point of time was 13, remained by his bedside and refused to move even after his mother tried to retrieve him. Given the politically uncertain times immediately preceding Akbar's death, Khurram was in a fair amount of physical danger from political opponents of his father.

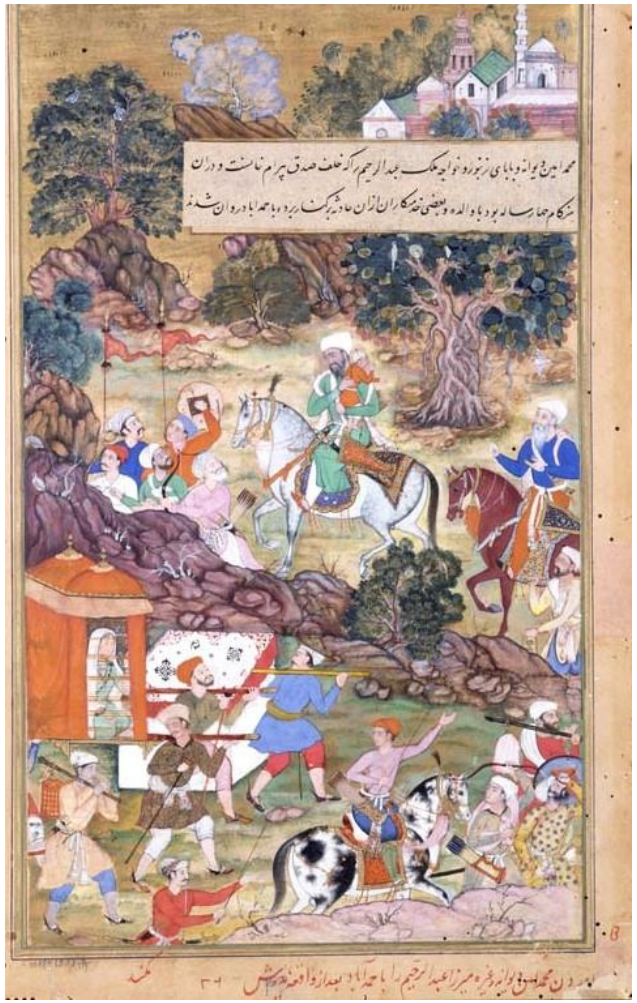
Shah Jahan

He was at last ordered to return to his quarters by the senior women of his grandfather's household, namely Salima Sultan Begum and his grandmother Mariam-uz-Zamani as Akbar's health deteriorated.

Salima Sultan Begum (23 February 1539 – 2 January 1613) was the third wife and chief consort of the Mughal emperor Akbar, and the granddaughter of Babur.

Salima was the daughter of Akbar's paternal aunt, Gulrukh Begum, and her husband, the Viceroy of Kannauj, Nuruddin Muhammad Mirza. She was initially betrothed to Akbar's regent, Bairam Khan, by her maternal uncle, Humayun.

Bairam Khan's widow and child (Abdul Rahim Khan-I-Khana) are escorted to Ahmedabad, after assasination of Bairam Khan in 1561, Akbarnama.



Shah Jahan

Khusrau rebellion

In 1605, his father succeeded to the throne, after crushing a rebellion by Prince Khusrau – Khurram remained distant from court politics and intrigues in the immediate aftermath of that event. Khurram left Ruqaiya's care and returned to his mother's care. As the third son, Khurram did not challenge the two major power blocs of the time, his father's and his half-brother's; thus, he enjoyed the benefits of imperial protection and luxury while being allowed to continue with his education and training. This relatively quiet and stable period of his life allowed Khurram to build his own support base in the Mughal court, which would be useful later on in his life.

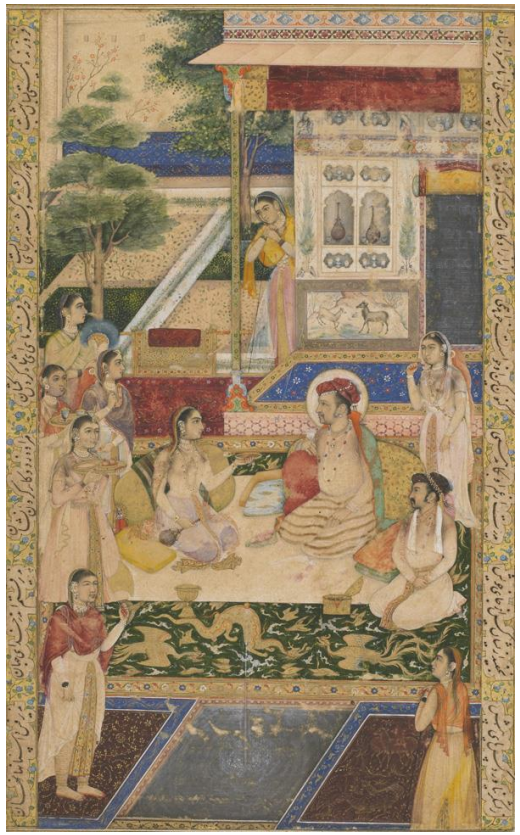
Jahangir assigned Khurram to guard the palace and treasury while he went to pursue Khusrau. He was later ordered to bring Mariam-uz-Zamani, his grandmother and Jahangir's harem to him.

During Khusrau's second rebellion, Khurram's informants informed him about Fatehullah, Nuruddin and Muhammad Sharif gathered around 500 men at Khusrau's instigation and lay await for the Emperor. Khurram relayed this information to Jahangir who praised him.

Jahangir had Khurram weighed against gold, silver and other wealth at his mansion at Orta.

Khusrau Mirza

Shah Jahan



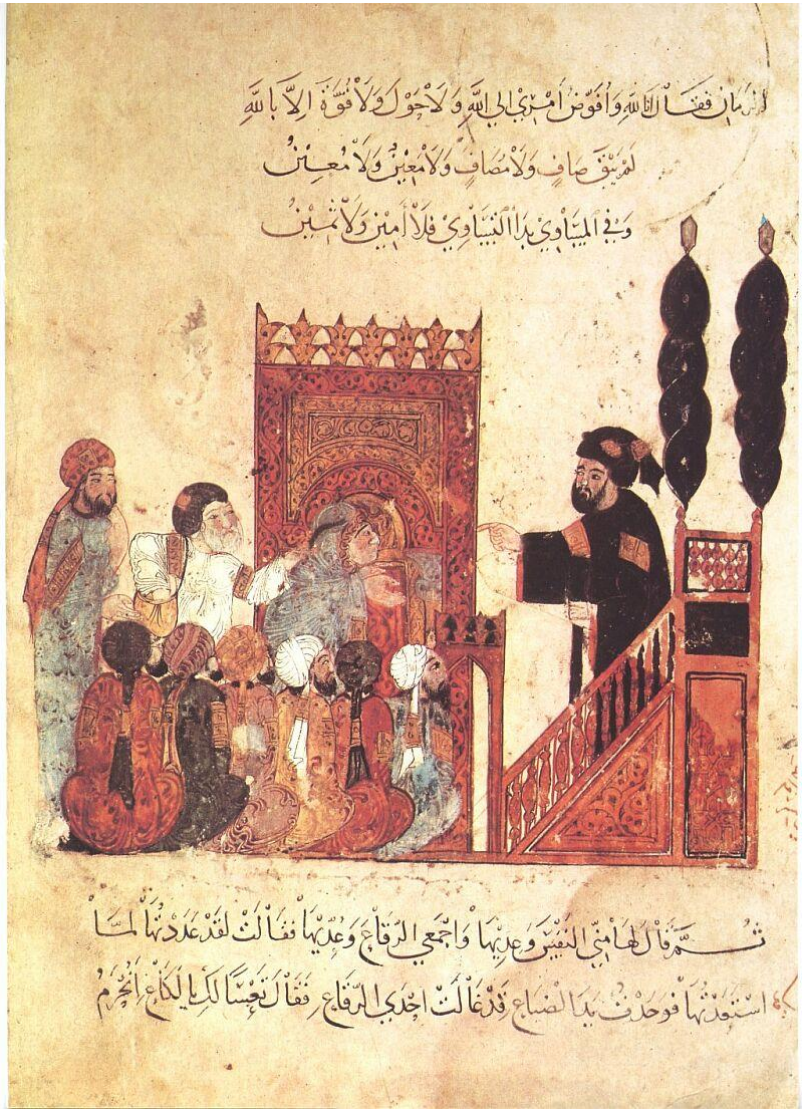
Jahangir and Nur Jahan with prince Khurram at Aram Bagh c. 1640-1650

Due to the long period of tensions between his father and his half-brother, Khusrau Mirza, Khurram began to drift closer to his father, and over time, started to be considered the de facto heir-apparent by court chroniclers. This status was given official sanction when Jahangir granted the sarkar of Hissar-e-Feroza, which had traditionally been the fief of the heir-apparent, to Khurram in 1608. After her marriage to Jahangir in the year 1611, Nur Jahan gradually became an active participant in all decisions made by Jahangir and gained extreme powers in administration, so much so that it was obvious to everyone both inside and outside that most of his decisions were actually hers.

Slowly, while Jahangir became more indulgent in wine and opium, she was considered to be the actual power behind the throne. Her near and dear relatives acquired important positions in the Mughal court, termed the Nur Jahan junta by historians. Khurram was in constant conflict with his stepmother, Nur Jahan who favoured her son-in-law Shahryar Mirza for the succession to the Mughal throne over him. In the last years of Jahangir's life, Nur Jahan was in full power, and the emperor had left all the burden of governance on her. She tried to weaken Khurram's position in the Mughal court by sending him on campaigns far in Deccan while ensuring several favours were being bestowed on her son-in-law. Khurram after sensing the danger posed to his status as heir-apparent rebelled against his father in 1622 but did not succeed and eventually lost the favour of his father.

Shah Jahan

Several years before Jahangir's death in 1627, coins began to be struck containing Nur Jahan's name along with Jahangir's name; In fact, there were two prerogatives of sovereignty for the legitimacy of a Muslim monarchy (reading the Khutbah and the other being the right to mint coins). After the death of Jahangir in 1627, a struggle developed between Khurram and his half-brother, Shahryar Mirza for the succession to the Mughal throne. Khurram won the battle of succession and became the fifth Mughal Emperor. Nur Jahan was subsequently deprived of her imperial stature, authority, privileges, honors and economic grants and was put under house arrest on the orders of Khurram and led a quiet and comfortable life till her death.



Abbasid Qadi delivers Khutbah in Mosque on the Minbar. (Khutbah was practiced by Caliphate, later it was also adopted by other Muslim rulers)

Marriages

Shah Jahan

In 1607, Khurram became engaged to Arjumand Banu Begum (1593–1631), who is also known as Mumtaz Mahal (Persian lit. 'The Exalted One of the Palace'). They were about 14 and 15 when they were engaged, and five years later, got married. The young girl belonged to an illustrious Persian noble family that included Abu'l-Hasan Asaf Khan, who had been serving Mughal emperors since the reign of Akbar. The family's patriarch was Mirza Ghiyas Beg, who was also known by his title I'timād-ud-Daulah or "Pillar of the State". He had been Jahangir's finance minister and his son, Asaf Khan – Arjumand Banu's father – played an important role in the Mughal court, eventually serving as Chief Minister. Her aunt Mehr-un-Nissa later became the Empress Nur Jahan, chief consort of Emperor Jahangir.

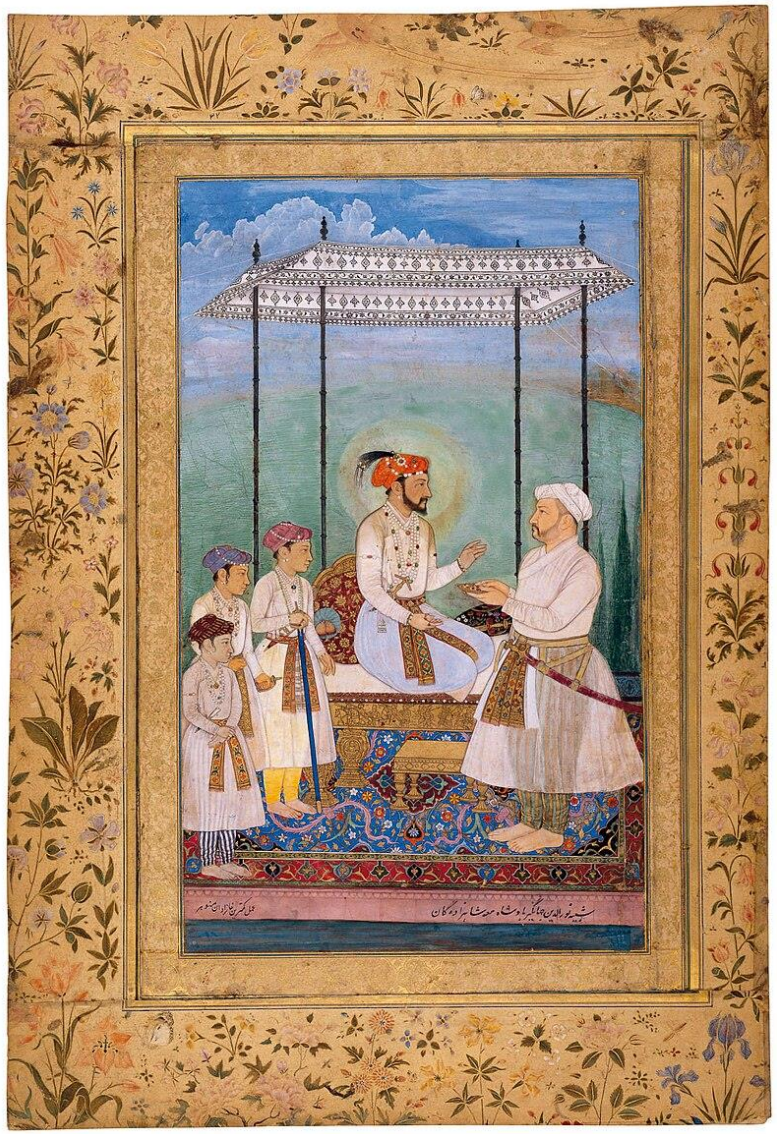
The prince would have to wait five years before he was married in 1612 (1021 AH), on a date selected by the court astrologers as most conducive to ensuring a happy marriage. This was an unusually long engagement for the time. However, Shah Jahan first married a Persian Princess (name not known) entitled Kandahari Begum, the daughter of a great-grandson of the great Shah Ismail I of Persia, with whom he had a daughter, his first child.

In 1612, aged 20, Khurram married Mumtaz Mahal, on a date chosen by court astrologers. The marriage was a happy one and Khurram remained devoted to her. They had fourteen children, out of whom seven survived into adulthood. Though there was genuine love between the two, Arjumand Banu Begum was a politically astute woman and served as a crucial advisor and confidante to her husband.

Shah Jahan

Later on, as empress, Mumtaz Mahal wielded immense power, such as being consulted by her husband in state matters, attending the council (shura or diwan), and being responsible for the imperial seal, which allowed her to review official documents in their final draft. Shah Jahan also gave her the right to issue her own orders (hukums) and make appointments to him.
Mumtaz Mahal died at the young age of 38 (7 June 1631), upon giving birth to Princess Gauhar Ara Begum in the city of Burhanpur, Deccan of a postpartum haemorrhage, which caused considerable blood-loss after painful labor of thirty hours. Contemporary historians note that Princess Jahanara, aged 17, was so distressed by her mother's pain that she started distributing gems to the poor, hoping for divine intervention, and Shah Jahan was noted as being "paralysed by grief" and weeping fits.

Her body was temporarily buried in a walled pleasure garden known as Zainabad, originally constructed by Shah Jahan's uncle Prince Daniyal along the Tapti River. Her death had a profound impact on Shah Jahan's personality and inspired the construction of the marvelous Taj Mahal, where she was later reburied.



Shah Jahan

Khurram had taken other wives, among whom were Kandahari Begum (m. 28 October 1610) and another Persian Princess Izz un-Nisa Begum (m. 2 September 1617), the daughters of Prince Muzaffar Husain Mirza Safawi and Shahnawaz Khan, son of Abdul Rahim Khan-I-Khana, respectively. But according to court chroniclers, these marriages were more out of political consideration, and they enjoyed only the status of being royal wives.

Khurram is also recorded to have married his maternal half-cousin, a Rathore Rajput Princess Kunwari Leelavati Deiji, daughter of Kunwar Sakat/Sagat or Shakti Singh son of Mota Raja Udai Singh and half brother of Raja Sur Singh of Marwar. The marriage took place at Jodhpur when Khurram was in rebellion against his father, emperor Jahangir.

Taj Mahal

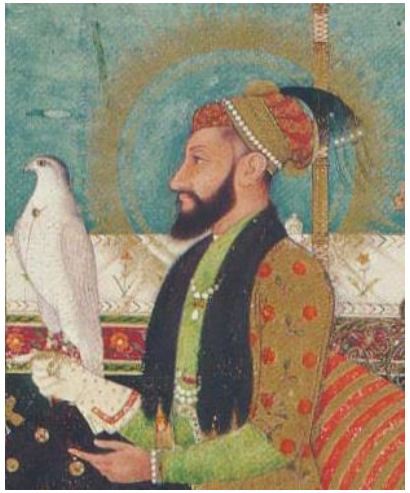
Shah Jahan

Relationship with Jahanara
After Shah Jahan fell ill in 1658, his daughter Jahanara Begum had a significant influence in the Mughal administration. As a result, several accusations of an incestual relationship between Shah Jahan and Jahanara were propagated. Such accusations have been dismissed by modern historians as gossip, as no witness of an incident has been mentioned.

Historian K. S. Lal also dismisses such claims as rumors propagated by courtiers and mullahs. He cites Aurangzeb's confining of Jahanara in the Agra Fort with the Royal prisoner and the talk of the low people magnifying a rumor.

Several contemporary travelers have mentioned such accessions. Francois Bernier, a French physician, mentions rumors of an incestuous relationship being propagated in the Mughal Court. However, Bernier did not mention witnessing such a relationship. Niccolao Manucci, a Venetian traveler, dismisses such accusations by Bernier as gossip and "The talk of the Low People".

Aurangzeb holds court, as painted by (perhaps) Bichitr; Shaistah Khan stands behind Prince Muhammad Azam



Shah Jahan

Early military campaigns

Prince Khurram showed extraordinary military talent. The first occasion for Khurram to test his military prowess was during the Mughal campaign against the Rajput state of Mewar, which had been a hostile force to the Mughals since Akbar's reign.

After a year of a harsh war of attrition, Rana Amar Singh I surrendered conditionally to the Mughal forces and became a vassal state of the Mughal Empire as a result of Mughal expedition of Mewar.[45] In 1615, Khurram presented Kunwar Karan Singh, Amar Singh's heir to Jahangir. Khurram was sent to pay homage to his mother and stepmothers and was later awarded by Jahangir. The same year, his mansab was increased from 12000/6000 to 15000/7000, to equal that his brother Parvez's and was further increased to 20000/10000 in 1616.

In 1616, on Khurram's departure to Deccan, Jahangir awarded him the title Shah Sultan Khurram.

Shah Jahan

In 1617, Khurram was directed to deal with the Lodis in the Deccan to secure the Empire's southern borders and to restore imperial control over the region. On his return 1617 after successes in these campaigns, Khurram performed koronush before Jahangir who called him to jharoka and rose from his seat to embrace him. Jahangir also granting him the title of Shah Jahan (Persian: "King of the World") and raised his military rank to 30000/20000 and allowed him a special throne in his Durbar, an unprecedented honor for a prince. Edward S. Holden writes, "He was flattered by some, envied by others, loved by none."

In 1618, Shah Jahan was given the first copy of Tuzk-e-Jahangiri by his father who considered him "the first of all my sons in everything.

The Deccan is a plateau extending over an area of 422,000 km2 (163,000 sq mi) and occupies the majority of the Indian peninsula. Shaped like an inverted triangle, it stretches from the Satpura and Vindhya Ranges in the north to the northern fringes of Tamil Nadu in the south. It is bound by the mountain ranges of the Western Ghats and the Eastern Ghats on the sides, which separate the region from the Western and Eastern Coastal Plains respectively. It covers most of the Indian States of Maharashtra, Telangana, Karnataka and Andhra Pradesh excluding the coastal regions, and minor portions of Tamil Nadu and Kerala.

The Submission of Rana Amar Singh of Mewar to Prince Khurram, Tuzk-e-Jahangiri.

Shah Jahan

Rebel prince

Inheritance in the Mughal Empire was not determined through primogeniture, but by princely sons competing to achieve military successes and consolidating their power at court. This often led to rebellions and wars of succession. As a result, a complex political climate surrounded the Mughal court in Shah Jahan's formative years. In 1611 his father married Nur Jahan, the widowed daughter of a Persian noble. She rapidly became an important member of Jahangir's court and, together with her brother Asaf Khan, wielded considerable influence. Arjumand was Asaf Khan's daughter and her marriage to Khurram consolidated Nur Jahan and Asaf Khan's positions in court.

Court intrigues, however, including Nur Jahan's decision to have her daughter from her first marriage wed Prince Khurram's youngest brother Shahzada Shahryar and her support for his claim to the throne led to much internal division. Prince Khurram resented the influence Nur Jahan held over his father and was angered at having to play second fiddle to her favourite Shahryar, his half-brother and her son-in-law. When the Persians besieged Kandahar, Nur Jahan was at the helm of the affairs. She ordered Prince Khurram to march for Kandahar, but he refused.

Shah Jahan

As a result of Prince Khurram's refusal to obey Nur Jahan's orders, Kandahar was lost to the Persians after a forty-five-day siege. Prince Khurram feared that in his absence Nur Jahan would attempt to poison his father against him and convince Jahangir to name Shahryar the heir in his place. This fear brought Prince Khurram to rebel against his father rather than fight against the Persians.

In 1622, Prince Khurram raised an army and marched against his father and Nur Jahan. He was defeated at Bilochpur in March 1623. Later he took refuge in Udaipur Mewar with Maharana Karan Singh II. He was first lodged in Delwada Ki Haveli and subsequently shifted to Jagmandir Palace on his request. Prince Khurram exchanged his turban with the Maharana and that turban is still preserved in Pratap Museum, Udaipur (R V Somani 1976).

It is believed that the mosaic work of Jagmandir inspired him to use mosaic work in the Taj Mahal of Agra. In November 1623, he found safe asylum in Bengal Subah after he was driven from Agra and the Deccan. He advanced through Midnapur and Burdwan. At Akbarnagar, he defeated and killed the then Subahdar of Bengal, Ibrahim Khan Fath-i-Jang, on 20 April 1624.

He entered Dhaka and "all the elephants, horses, and 4,000,000 rupees in specie belonging to the Government were delivered to him". After a short stay he then moved to Patna. His rebellion did not succeed in the end and he was forced to submit unconditionally after he was defeated near Allahabad. Although the prince was forgiven for his errors in 1626, tensions between Nur Jahan and her stepson continued to grow beneath the surface.

Shah Jahan

Upon the death of Jahangir in 1627, the wazir Asaf Khan, who had long been a quiet partisan of Prince Khurram, acted with unexpected forcefulness and determination to forestall his sister's plans to place Prince Shahryar on the throne. He put Nur Jahan in close confinement. He obtained control of Prince Khurram's three sons who were under her charge. Asaf Khan also managed palace intrigues to ensure Prince Khurram's succession to the throne. Prince Khurram succeeded to the Mughal throne as Abu ud-Muzaffar Shihab ud-Din Mohammad Sahib ud-Quiran ud-Thani Shah Jahan Padshah Ghazi (Urdu: ,(شهاب الدین محمد خرم‌or Shah Jahan.

His regnal name is divided into various parts. Shihab ud-Din, meaning "Star of the Faith", Sahib al-Quiran ud-Thani, meaning "Second Lord of the Happy Conjunction of Jupiter and Venus". Shah Jahan, meaning "King of the World", alluding to his pride in his Timurid roots and his ambitions. More epithets showed his secular and religious duties. He was also titled Hazrat Shahenshah ("His Imperial Majesty"), Hazrat-i-Khilafat-Panahi ("His Majesty the Refuge of the Caliphate"), Hazrat Zill-i-Ilahi ("His Majesty the Shadow of God")

His first act as ruler was to execute his chief rivals and imprison his stepmother Nur Jahan. Upon Shah Jahan's orders, several executions took place on 23 January 1628. Those put to death included his brother Shahryar; his nephews Dawar and Garshasp, sons of Shah Jahan's previously executed brother Prince Khusrau; and his cousins Tahmuras and Hoshang, sons of the late Prince Daniyal Mirza. This allowed Shah Jahan to rule his empire without contention.

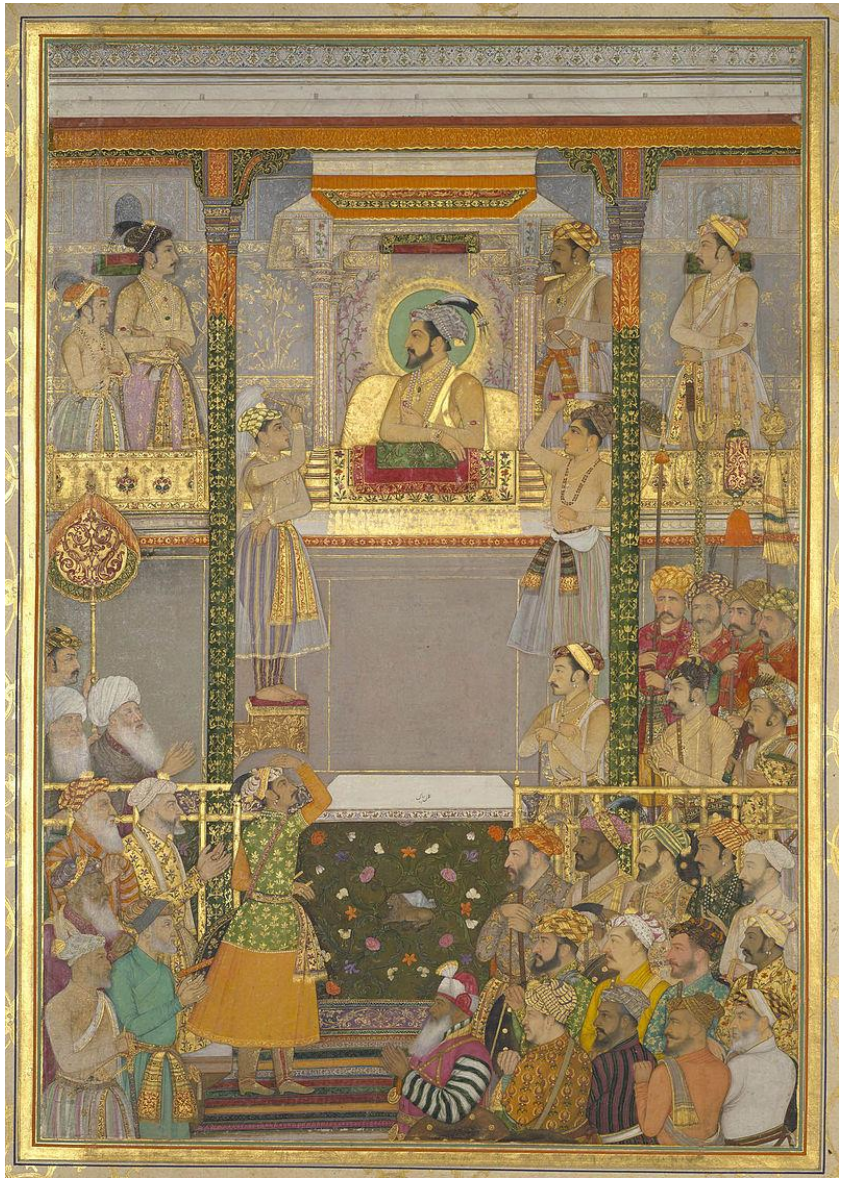
Reign

Shah Jahan

Evidence from the reign of Shah Jahan states that in 1648 the army consisted of 911,400 infantry, musketeers, and artillery men, and 185,000 Sowars commanded by princes and nobles.

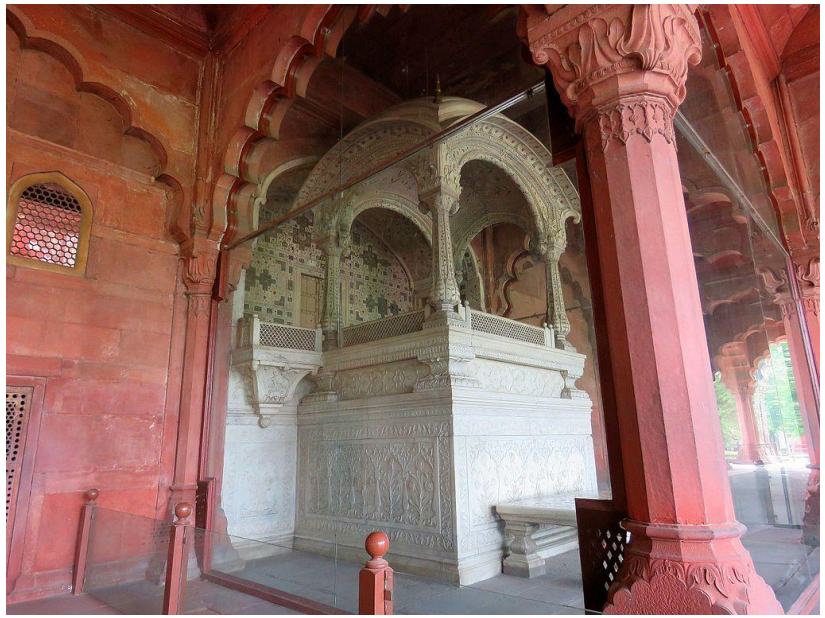
His cultural and political initial steps have been described as a type of the Timurid Renaissance, in which he built historical and political bonds with his Timurid heritage mainly via his numerous unsuccessful military campaigns on his ancestral region of Balkh. In various forms, Shah Jahan appropriated his Timurid background and grafted it onto his imperial legacy.

During his reign the Marwari horse was introduced, becoming Shah Jahan's favorite, and various Mughal cannons were mass-produced in the Jaigarh Fort. Under his rule, the empire became a huge military machine and the nobles and their contingents multiplied almost fourfold, as did the demands for more revenue from their citizens. But due to his measures in the financial and commercial fields, it was a period of general stability – the administration was centralized and court affairs systematized.

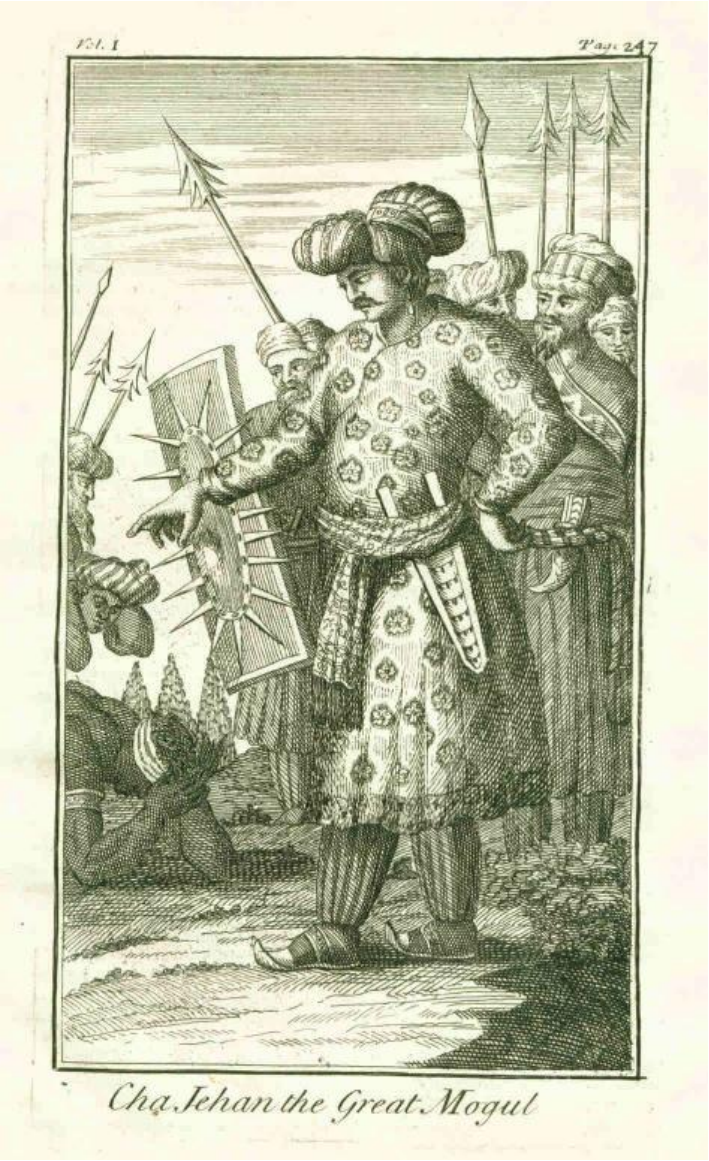


Shah Jahan

The Mughal Empire continued to expand moderately during his reign as his sons commanded large armies on different fronts. India at the time was a rich center of the arts, crafts and architecture, and some of the best of the architects, artisans, craftsmen, painters and writers of the world resided in Shah Jahan's empire. According to economist Angus Maddison, Mughal-era India's share of global gross domestic product (GDP) grew from 22.7% in 1600 to 24.4% in 1700, surpassing China to become the world's largest. E. Dewick and Murray Titus, quoting Badshahnama, write that 76 temples in Benares were demolished on Shah Jahan's orders.



Throne of Mughal Emperor Shah Jahan of India, Red Fort, Delhi



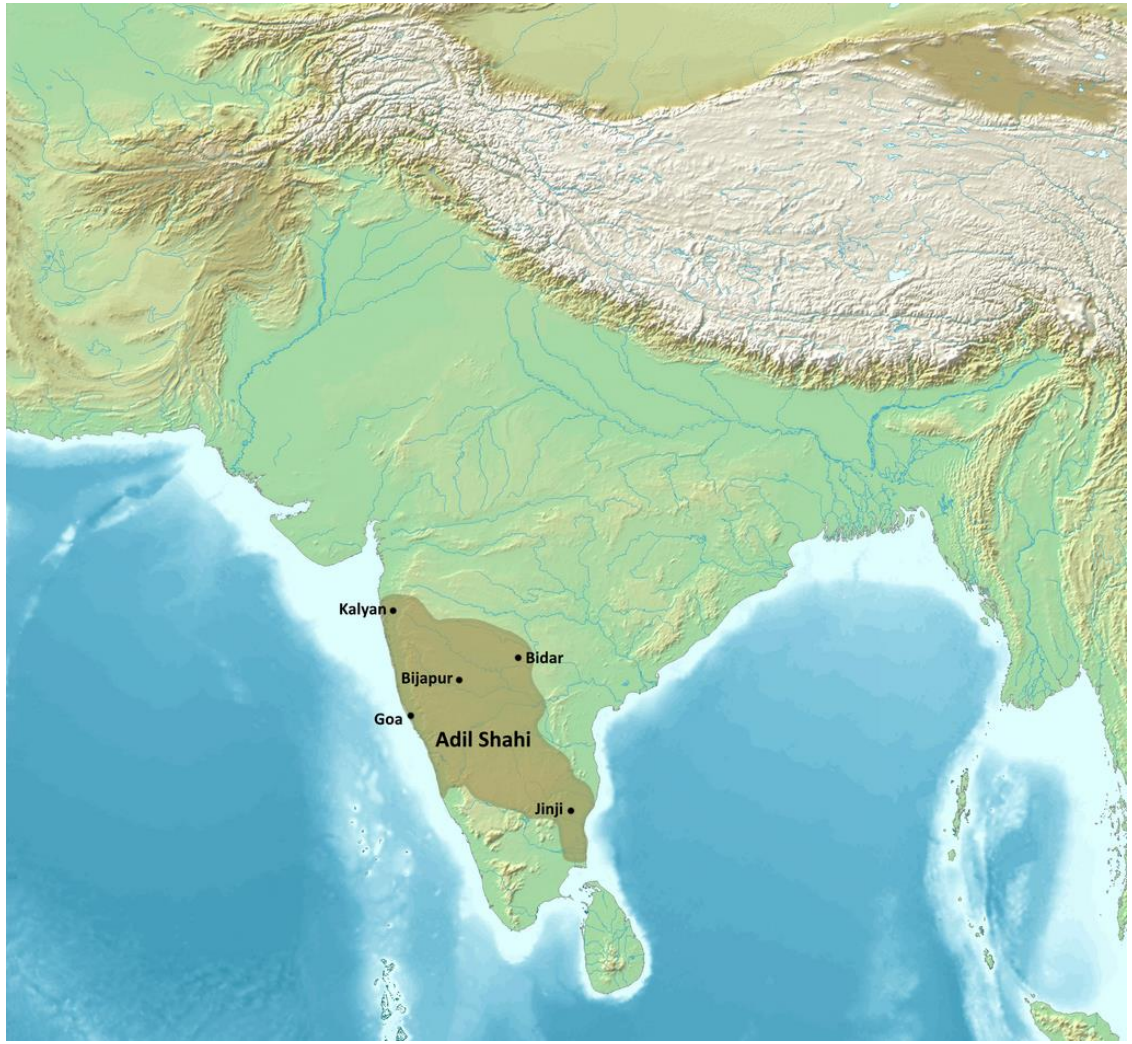
Shah Jahan

The Red Fort, also known as Lal Qila) is a historic Mughal fort in Delhi, India, that served as the primary residence of the Mughal emperors.

Deccan famine of 1630–1632

Shah Jahan

The Deccan famine of 1630–1632 was a famine associated with a back-to-back crop failure. The famine happened during the reign of Mughal Emperor Shah Jahan. The famine was the result of three consecutive staple crop failures, causing plague and leading to intense hunger, disease, and displacement in the region. The famine was further intensified by the Mughal campaign led by Shah Jahan in Malwa and the Deccan after Malwa's Mughal commander turned rogue and joined hands with the Deccan forces of Nizam Shah and Adil Shah. About three million people died in Gujarat in the ten months ending in October 1631 while another million died around Ahmednagar. The report gives an overall death toll of 7.4 million by late 1631, which might be for the whole region.

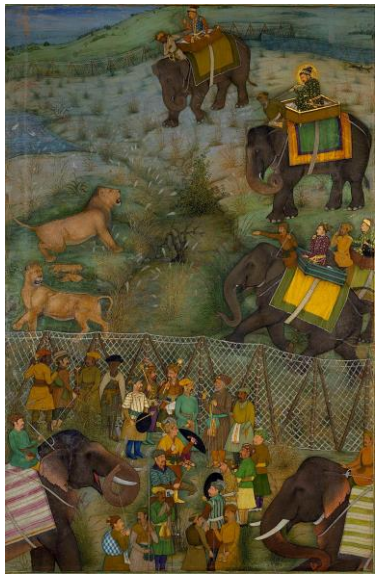


Shah Jahan

Successful military campaigns against Deccan Sultanates
In 1632, Shah Jahan captured the fortress at Daulatabad, Maharashtra and imprisoned Husein Shah of the Nizam Shahi Kingdom of Ahmednagar. Golconda submitted in 1635 and then Bijapur in 1636. Shah Jahan appointed Aurangzeb as Viceroy of the Deccan, consisting of Khandesh, Berar, Telangana, and Daulatabad. During his viceroyalty, Aurangzeb conquered Baglana, then Golconda in 1656, and then Bijapur in 1657.

Sikh rebellion led by Guru Hargobind

A rebellion of the Sikhs led by Guru Hargobind took place and, in response, Shah Jahan ordered their destruction. Guru Hargobind defeated the Mughal's army in the Battle of Amritsar, Battle of Kartarpur, Battle of Rohilla, and the Battle of Lahira.



Relations with the Safavid dynasty

Shah Jahan and his sons captured the city of Kandahar in 1638 from the Safavids, prompting the retaliation of the Persians led by their ruler Abbas II of Persia, who recaptured it in 1649. The Mughal armies were unable to recapture it despite repeated sieges during the Mughal–Safavid War. Shah Jahan also expanded the Mughal Empire to the west beyond the Khyber Pass to Ghazna and Kandahar.

Shah Jahan

Military campaign in Central Asia

Shah Jahan launched an invasion of Central Asia from 1646 to 1647 against the Khanate of Bukhara. With an total army of 75,000, Shah Jahan and his sons Aurangzeb and Murad Bakhsh temporarily occupied the territories of Balkh and Badakhshan. However, they retreated from the fruitless lands and Balkh and Badakhshan returned to Bukharan control

Relations with the Ottoman Empire

Shah Jahan sent an embassy to the Ottoman court in 1637. Led by Mir Zarif, it reached Sultan Murad IV the following year, while he was encamped in Baghdad. Zarif presented him with fine gifts and a letter which encouraged an alliance against Safavid Persia. The Sultan sent a return embassy led by Arsalan Agha. Shah Jahan received the ambassador in June 1640.

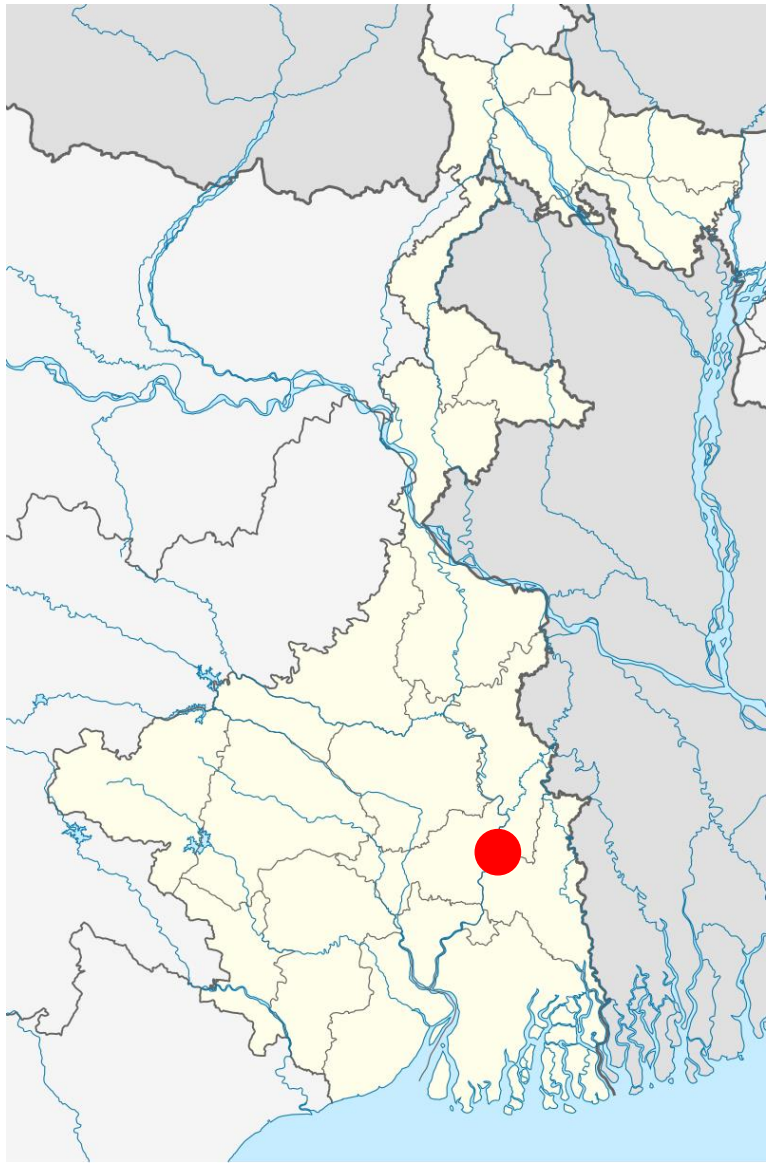
While he was encamped in Baghdad, Murad IV is known to have met ambassadors of the Mughal Emperor Shah Jahan, Mir Zarif and Mir Baraka, who presented 1000 pieces of finely embroidered cloth and even armor. Murad IV gave them the finest weapons, saddles and Kaftans and ordered his forces to accompany the Mughals to the port of Basra, where they set sail to Thatta and finally Surat. They exchanged lavish presents, but Shah Jahan was displeased with Sultan Murad's return letter, the tone of which he found discourteous. Sultan Murad's successor, Sultan Ibrahim, sent Shah Jahan another letter encouraging him to wage war against the Persians, but there is no record of a reply.

Shah Jahan

War with Portuguese

Shah Jahan gave orders in 1631 to Qasim Khan, the Mughal viceroy of Bengal, to drive out the Portuguese from their trading post at Port Hoogly. The post was heavily armed with cannons, battleships, fortified walls, and other instruments of war. The Portuguese were accused of trafficking by high Mughal officials and due to commercial competition the Mughal-controlled port of Saptagram began to slump. Shah Jahan was particularly outraged by the activities of Jesuits in that region, notably when they were accused of abducting peasants. On 25 September 1632, the Mughal Army raised imperial banners and gained control over the Bandel region, and the garrison was punished. On 23 December 1635, Shah Jahan issued a farman ordering the Agra Church to be demolished. The Church was occupied by the Portuguese Jesuits. However the Emperor allowed the Jesuits to conduct their religious ceremonies in privacy. He also banned the Jesuits in preaching their religion and making converts from both Hindus and Muslims.Though in the decree, he also granted 777 bighas of rent-free land to the Augustinian Fathers and the Christian community in Bandel, currently in West Bengal, shaping its Portuguese heritage for times to come

Shah Jahan



Bandel is a neighbourhood in the Hooghly district of the Indian state of West Bengal. It was founded by Portuguese settlers and falls under the jurisdiction of Chandernagore Police Commissionerate. It is a part of the area covered by Kolkata Metropolitan Development Authority (KMDA). Bandel is a major rail junction station of Eastern Railway zone, and is 38 km from Howrah railway station.

Hugli-Chuchura, also known by its former names Chinsurah or Hooghly-Chinsurah, is a city of Hooghly district and the district headquarters of Hooghly division in the Indian state of West Bengal.

Shah Jahan

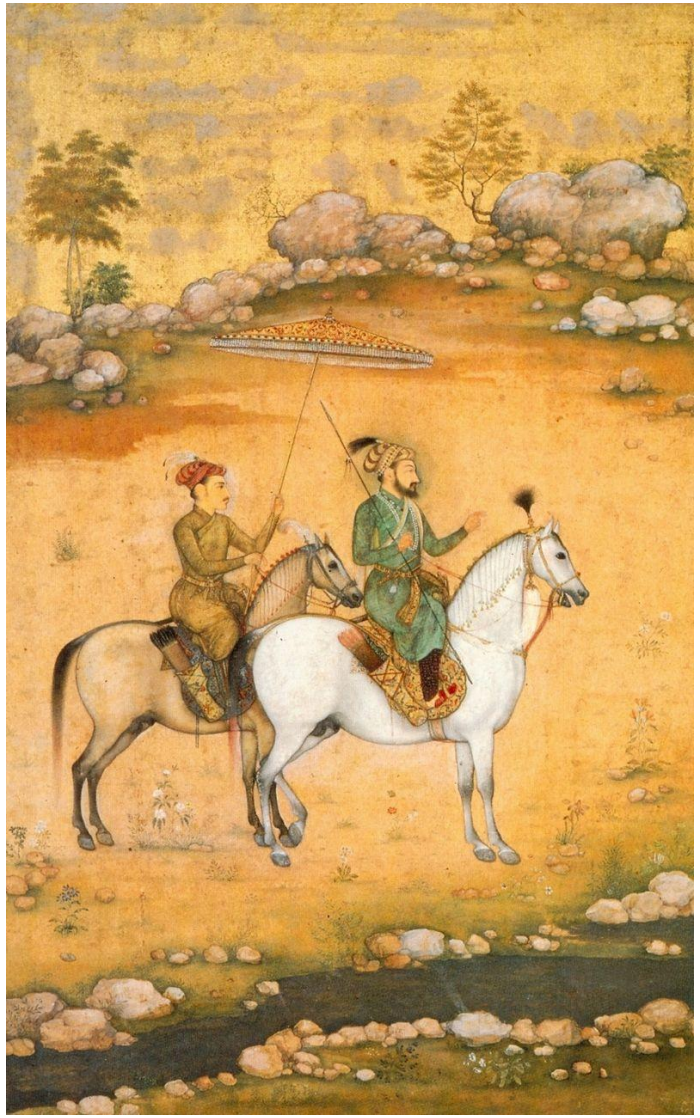
Revolts against Shah Jahan

The Kolis of Gujarat rebelled against the rule of Shah Jahan. In 1622, Shah Jahan sent Raja Vikramjit, the Governor of Gujarat, to subdue the Kolis of Ahmedabad. Between 1632 and 1635, four viceroys were appointed in an effort to manage the Koli's activities. The Kolis of Kankrej in North Gujarat committed excesses and the Jam of Nawanagar refused to pay tribute to Shah Jahan. Soon, Ázam Khán was appointed in an effort to subdue the Kolis and bring order to the province. Ázam Khán marched against Koli rebels. When Ázam Khán reached Sidhpur, the local merchants complained bitterly of the outrages of one Kánji, a Chunvalia Koli, who had been especially daring in plundering merchandise and committing highway robberies. Ázam Khán, anxious to start with a show of vigour before proceeding to Áhmedábád, marched against Kánji, who fled to the village of Bhádar near Kheralu, sixty miles north-east of Áhmedábád. Ázam Khán pursued him so hotly that Kánji surrendered, handed over his plunder and guaranteed that he would not only cease to commit robberies but also pay an annual tribute of Rupees 10,000. Ázam Khán then built two fortified posts in the Koli's territory, naming one Ázamábád after himself, and the other Khalílábád after his son. Additionally, he forced the surrender of the Jam of Nawanagar. The next viceroy, Ísa Tarkhán, carried out financial reforms.

In 1644, the Mughal prince Aurangzeb was appointed as the viceroy, who then proceeded to become engaged in religious disputes, such as the destruction of a Jain temple in Ahmedabad. Due to these disputes, he was replaced by Shaista Khan who failed to subdue Kolis. Subsequently, prince Murad Bakhsh was appointed as the viceroy in 1654. He restored order and defeated the Koli rebels

Shah Jahan

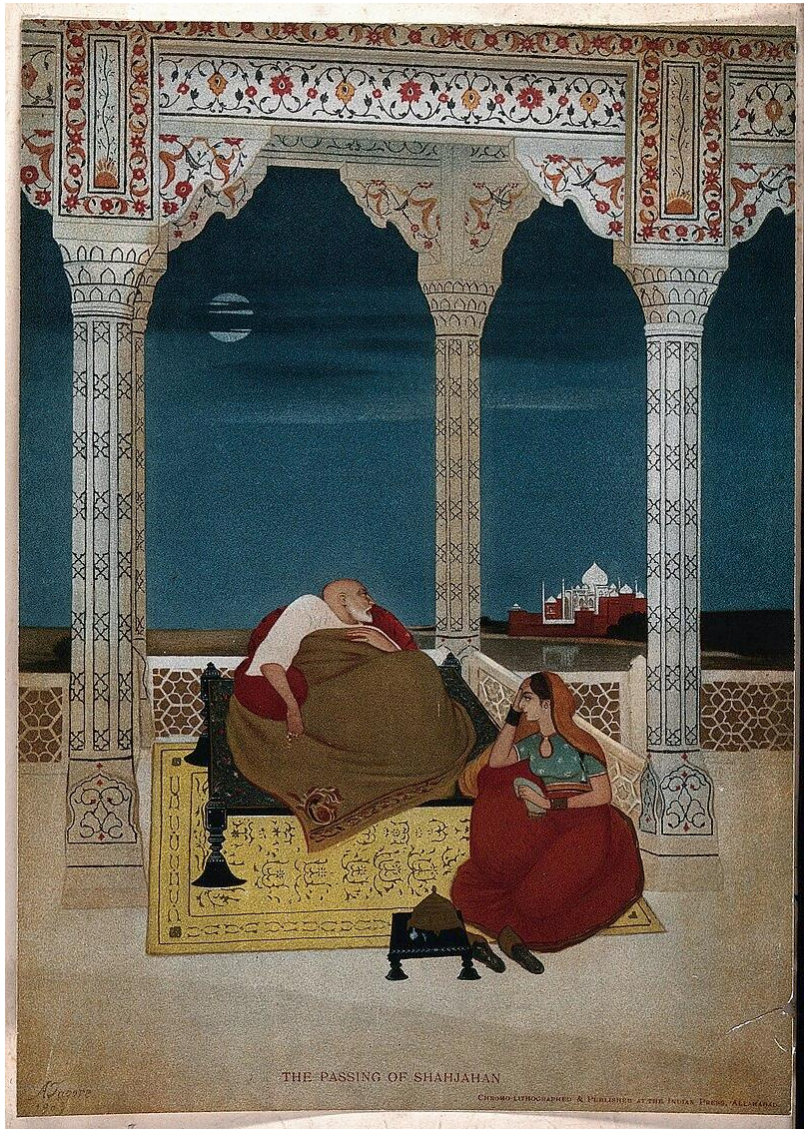
Illness and death



When Shah Jahan became ill in 1658, Dara Shikoh (Mumtaz Mahal's eldest son) assumed the role of regent in his father's stead, which swiftly incurred the animosity of his brothers. Upon learning of his assumption of the regency, his younger brothers, Shuja, Viceroy of Bengal, and Murad Baksh, Viceroy of Gujarat, declared their independence and marched upon Agra in order to claim their riches. Aurangzeb, the third son, gathered a well-trained army and became its chief commander. He faced Dara's army near Agra and defeated him during the Battle of Samugarh. Although Shah Jahan fully recovered from his illness, Aurangzeb declared him incompetent to rule and put him under house arrest in Agra Fort.

Jahanara Begum Sahib, Mumtaz Mahal's eldest surviving daughter, voluntarily shared his 8-year confinement and nursed him in his dotage. In January 1666, Shah Jahan fell ill. Confined to bed, he became progressively weaker until, on 22 January, he commended the ladies of the imperial court, particularly his consort of later years Akbarabadi Mahal, to the care of Jahanara. After reciting the Kal'ma (Laa ilaaha ill allah) and verses from the Quran, Shah Jahan died, aged 74.

Shah Jahan



Shah Jahan's chaplain Sayyid Muhammad Qanauji and Kazi Qurban of Agra came to the fort, moved his body to a nearby hall, washed it, enshrouded it, and put it in a coffin of sandalwood.

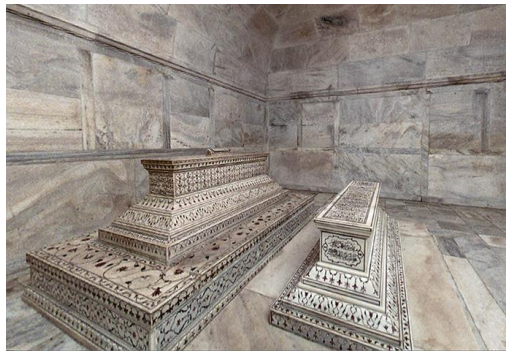
Princess Jahanara had planned a state funeral which was to include a procession with Shah Jahan's body carried by eminent nobles followed by the notable citizens of Agra and officials scattering coins for the poor and needy. Aurangzeb refused to accommodate such ostentation. The body was taken to the Taj Mahal and was interred there next to the body of his beloved wife Mumtaz Mahal.

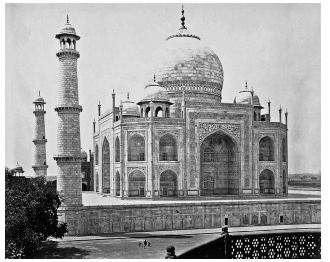
Seventh-century Quran manuscript held by the University of Birmingham.

Shah Jahan

Shah Jahan left behind a grand legacy of structures constructed during his reign. He was one of the greatest patrons of Mughal architecture. His reign ushered in the golden age of Mughal architecture. His most famous building was the Taj Mahal, which he built out of love for his wife, the empress Mumtaz Mahal. His relationship with Mumtaz Mahal has been heavily adapted into Indian art, literature and cinema. Shah Jahan personally owned the royal treasury, and several precious stones such as the Kohinoor.

Taj Mahal has become a prominent image that is associated with India.

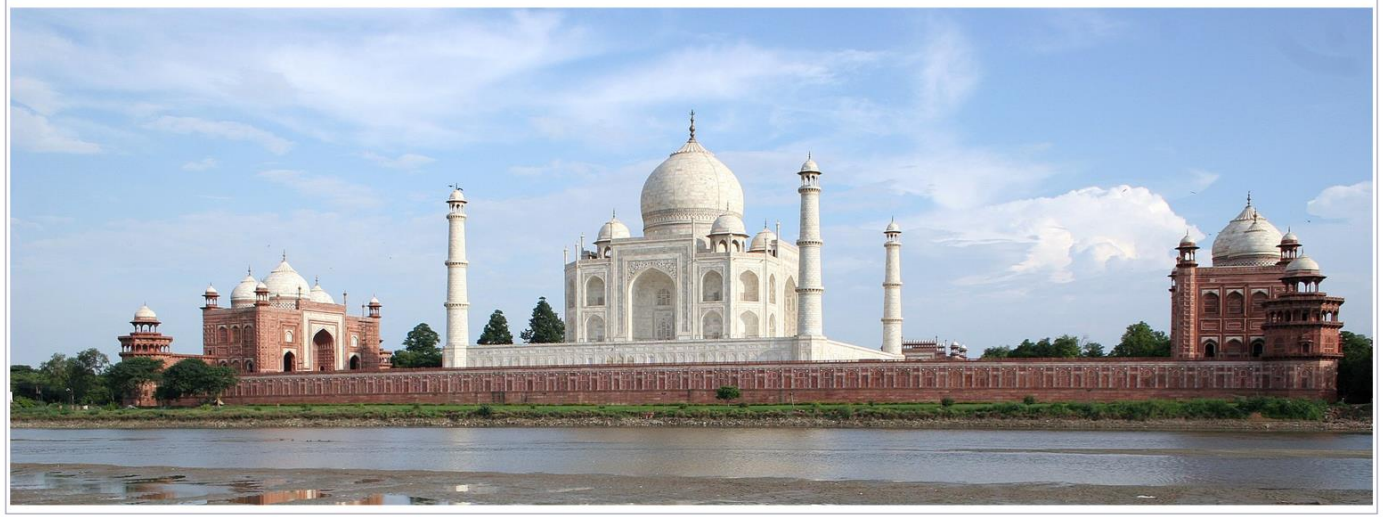




Shah Jahan

Its structure was drawn with great care and architects from all over the world were called for this purpose. The building took twenty years to complete and was constructed from white marble underlaid with brick. Upon his death, his son Aurangzeb had him interred in it next to Mumtaz Mahal. Among his other constructions are the Red Fort also called the Delhi Fort or Lal Qila in Urdu, large sections of Agra Fort, the Jama Masjid, the Wazir Khan Mosque, the Moti Masjid, the Shalimar Gardens, sections of the Lahore Fort, the Mahabat Khan Mosque in Peshawar, the Mini Qutub Minar in Hastsal, the Jahangir mausoleum – his father's tomb, the construction of which was overseen by his stepmother Nur Jahan and the Shahjahan Mosque. He also had the Peacock Throne, Takht e Taus, made to celebrate his rule. Shah Jahan also placed profound verses of the Quran on his masterpieces of architecture.

Taj Mahal

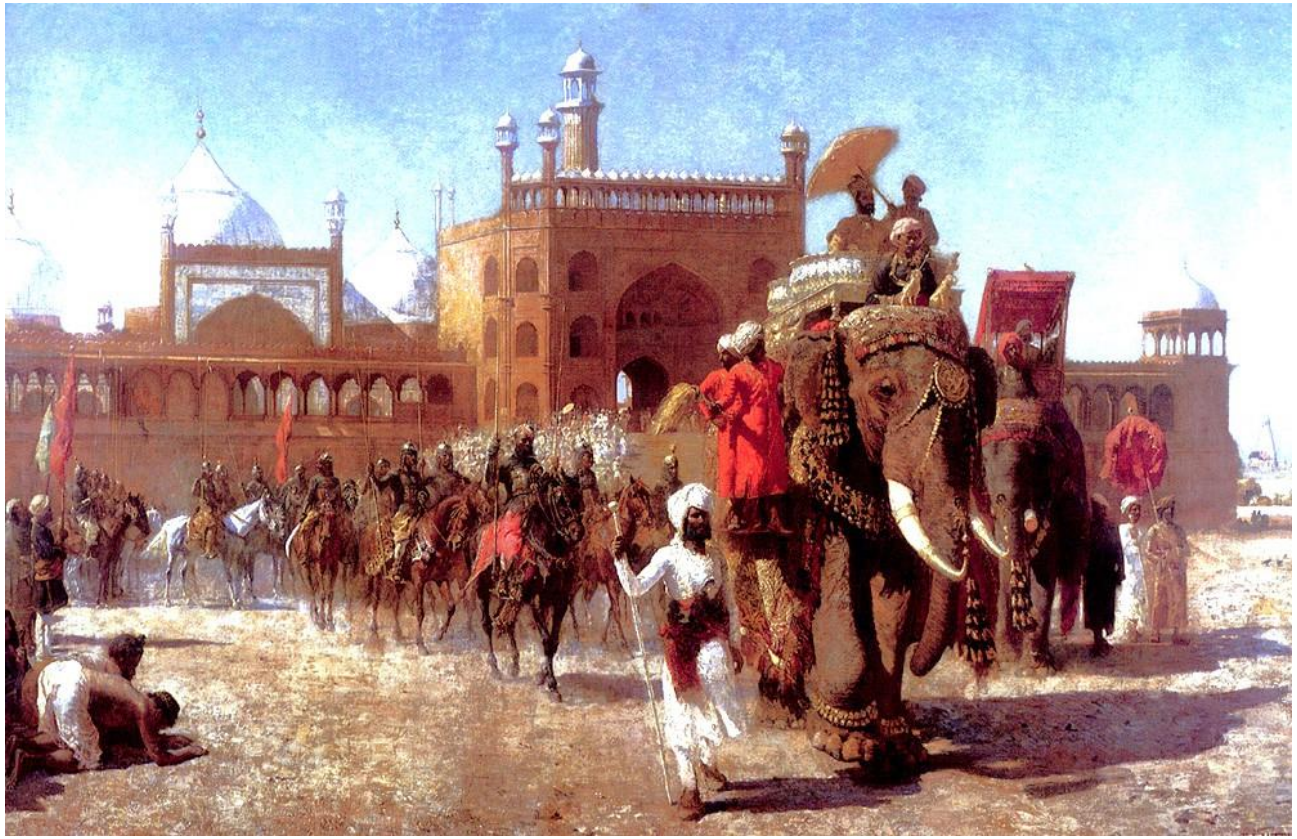


Shah Jahan, 17th century painting

Artistic depiction of Mumtaz Mahal

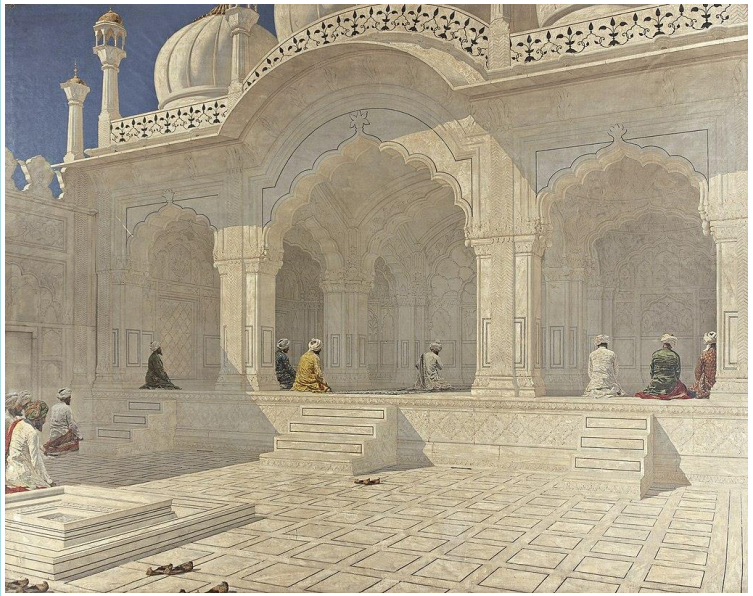
Shah Jahan

The Shah Jahan Mosque in Thatta, Sindh province of Pakistan (100 km / 60 miles from Karachi) was built during the reign of Shah Jahan in 1647. The mosque is built with red bricks with blue coloured glaze tiles probably imported from another Sindh's town of Hala. The mosque has overall 93 domes and it is the world's largest mosque having such a number of domes. It has been built keeping acoustics in mind. A person speaking inside one end of the dome can be heard at the other end when the speech exceeds 100 decibels. It has been on the tentative UNESCO World Heritage list since 1993.

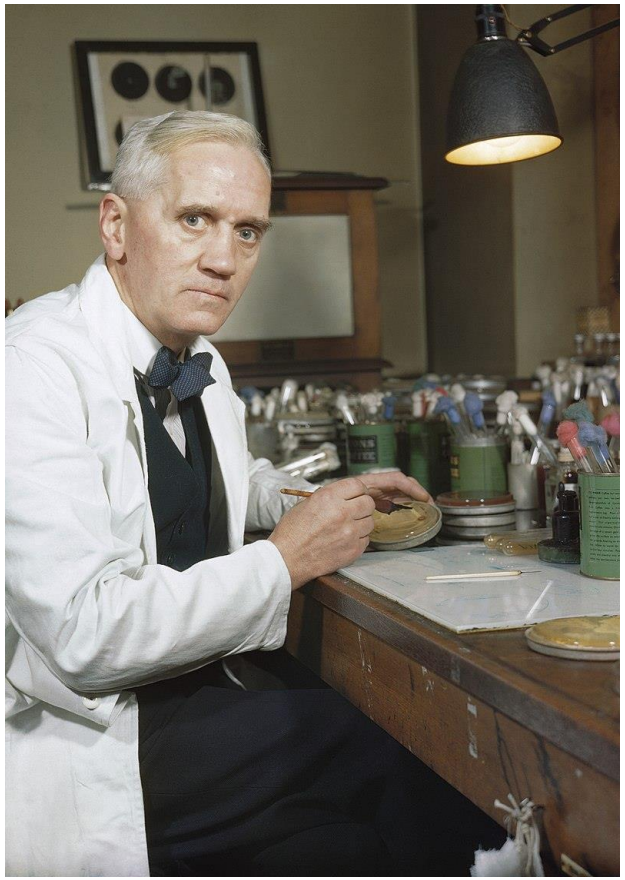


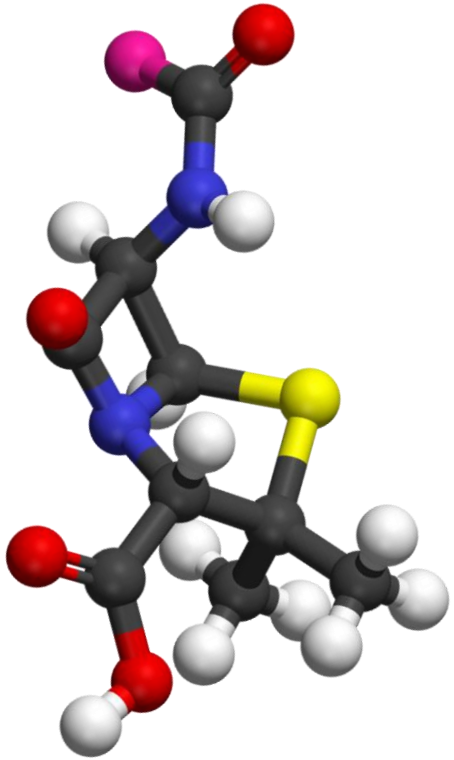
Shah Jahan

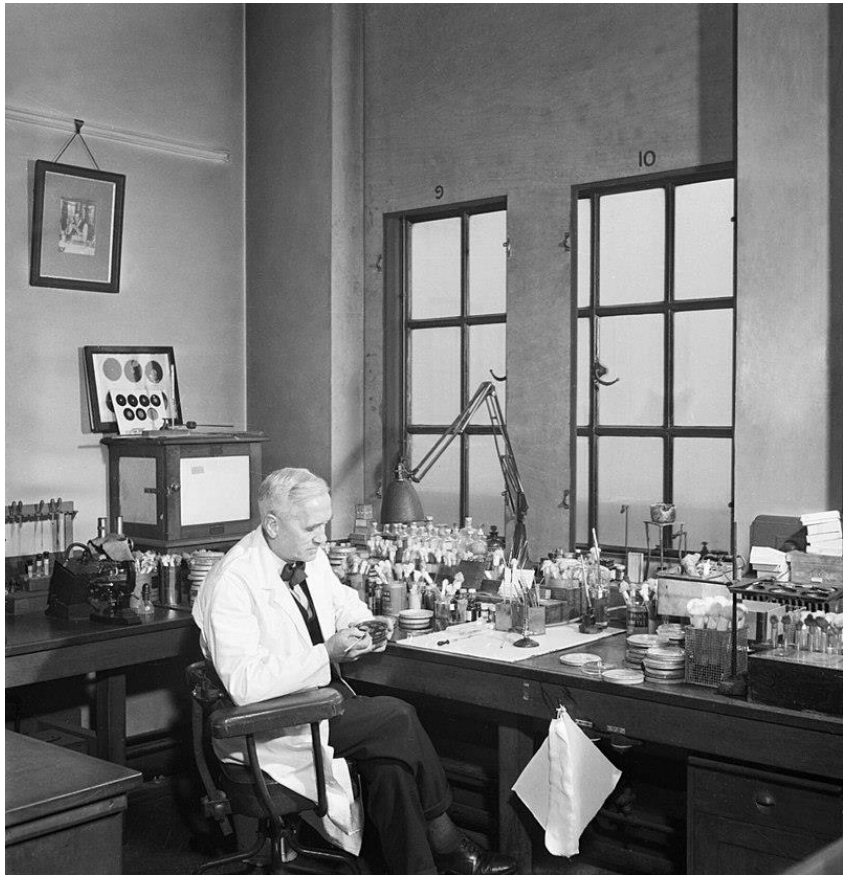
Lahore's Wazir Khan Mosque is considered to be the most ornate Mughal-era mosque.



Moti Masjid (Red Fort)







Sir Alexander Fleming

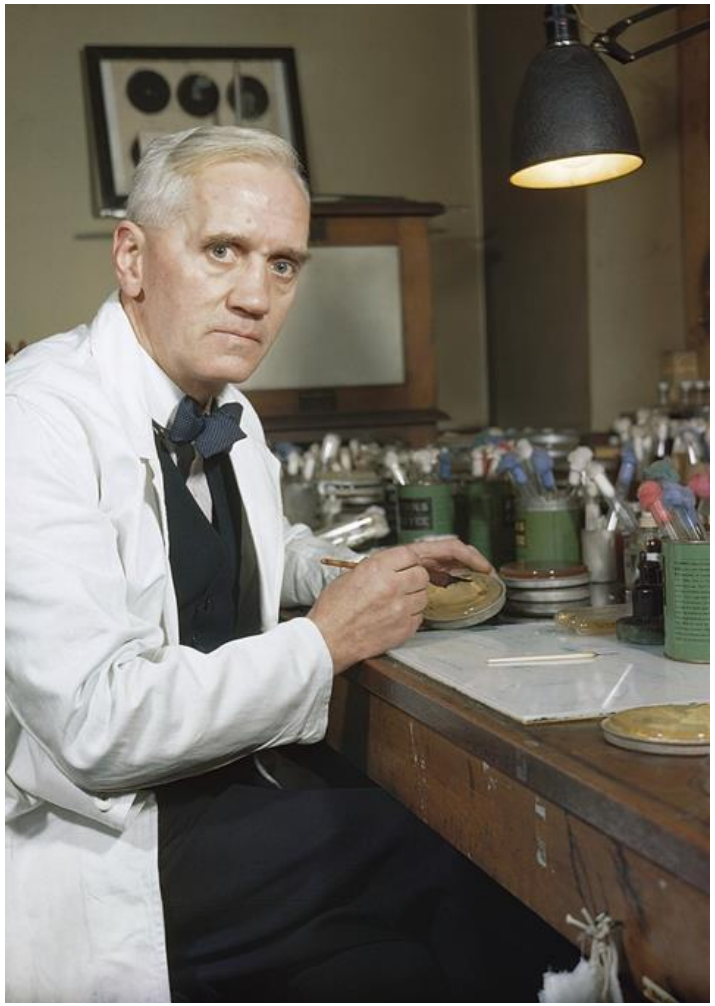
Best known for discovering the world's first broadly effective antibiotic substance, which he named penicillin.

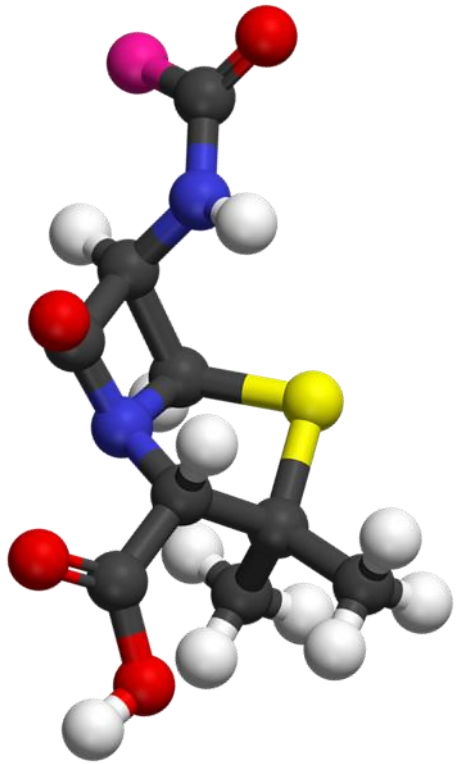
Anders Dernback text Wikipedia

Sir Alexander Fleming

One sometimes finds what one is not looking for. When I woke up just after dawn on September 28, 1928, I certainly didn't plan to revolutionize all medicine by discovering the world's first antibiotic, or bacteria killer. But I suppose that was exactly what I did.

—Alexander Fleming

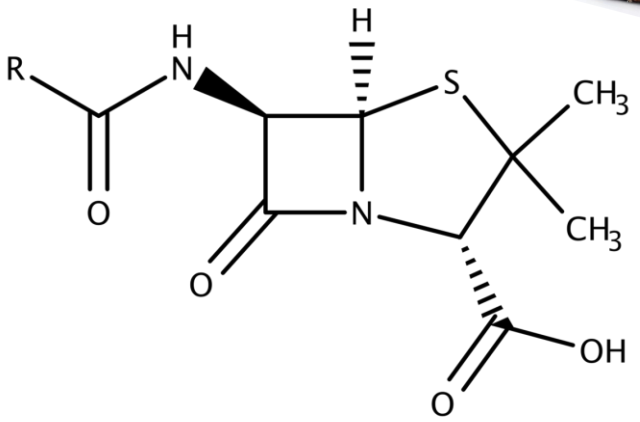




Sir Alexander Fleming

The development of the first antibiotic, penicillin, ranks among the top medical discoveries of all time, and was the subject of a Nobel Prize in 1945.

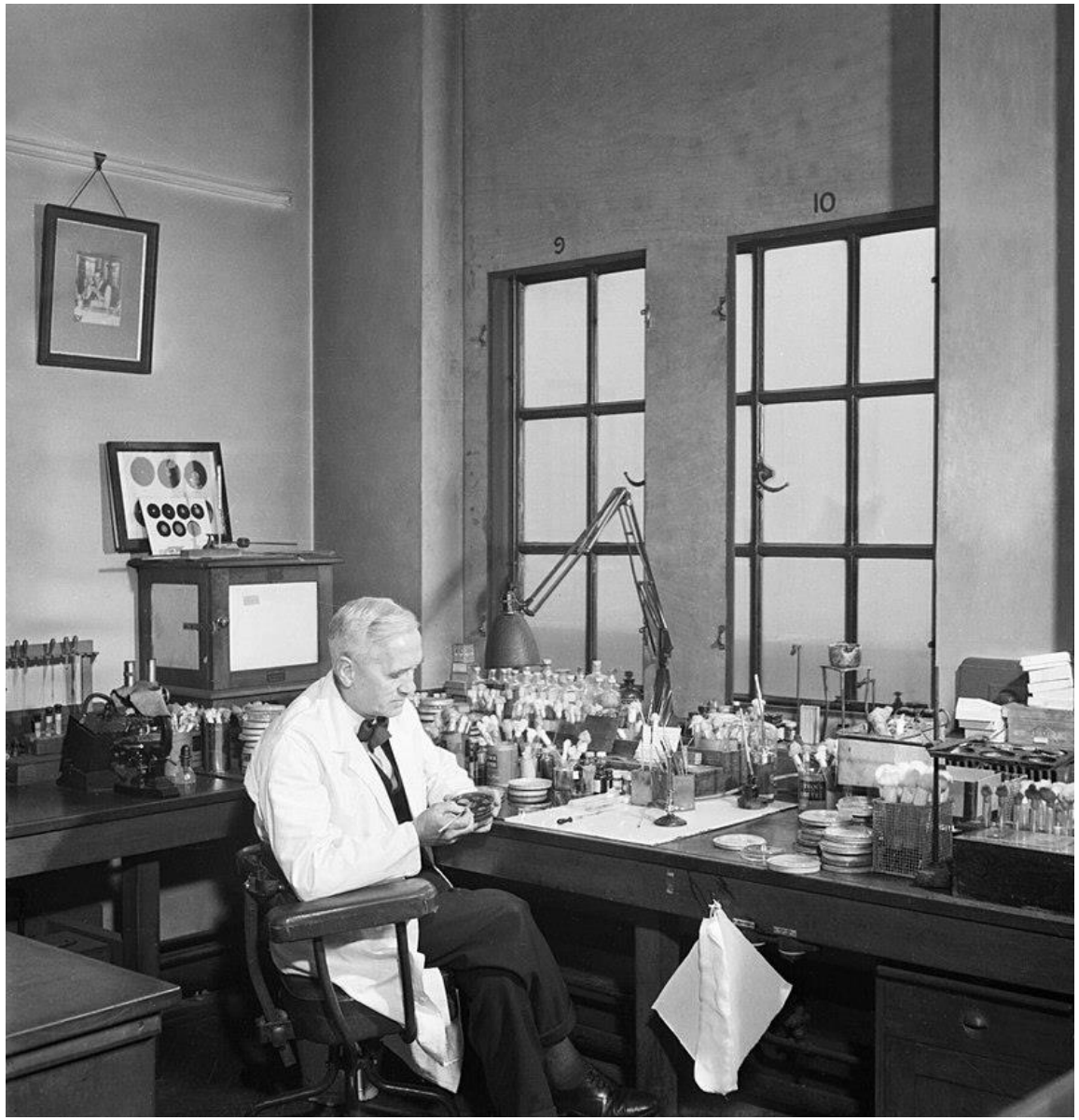
Although he initially improved, supplies of penicillin ran out and he succumbed to his infection. The dedicated work of the team of Florey, Chain and Heatley ushered in the age of modern medicine, and paved the way for drug discovery. It has been estimated that over 500 million lives have now been saved by penicillin.



Sir Alexander Fleming

Sir Alexander Fleming (centre) receiving the Nobel prize from King Gustaf V of Sweden (right) in 1945

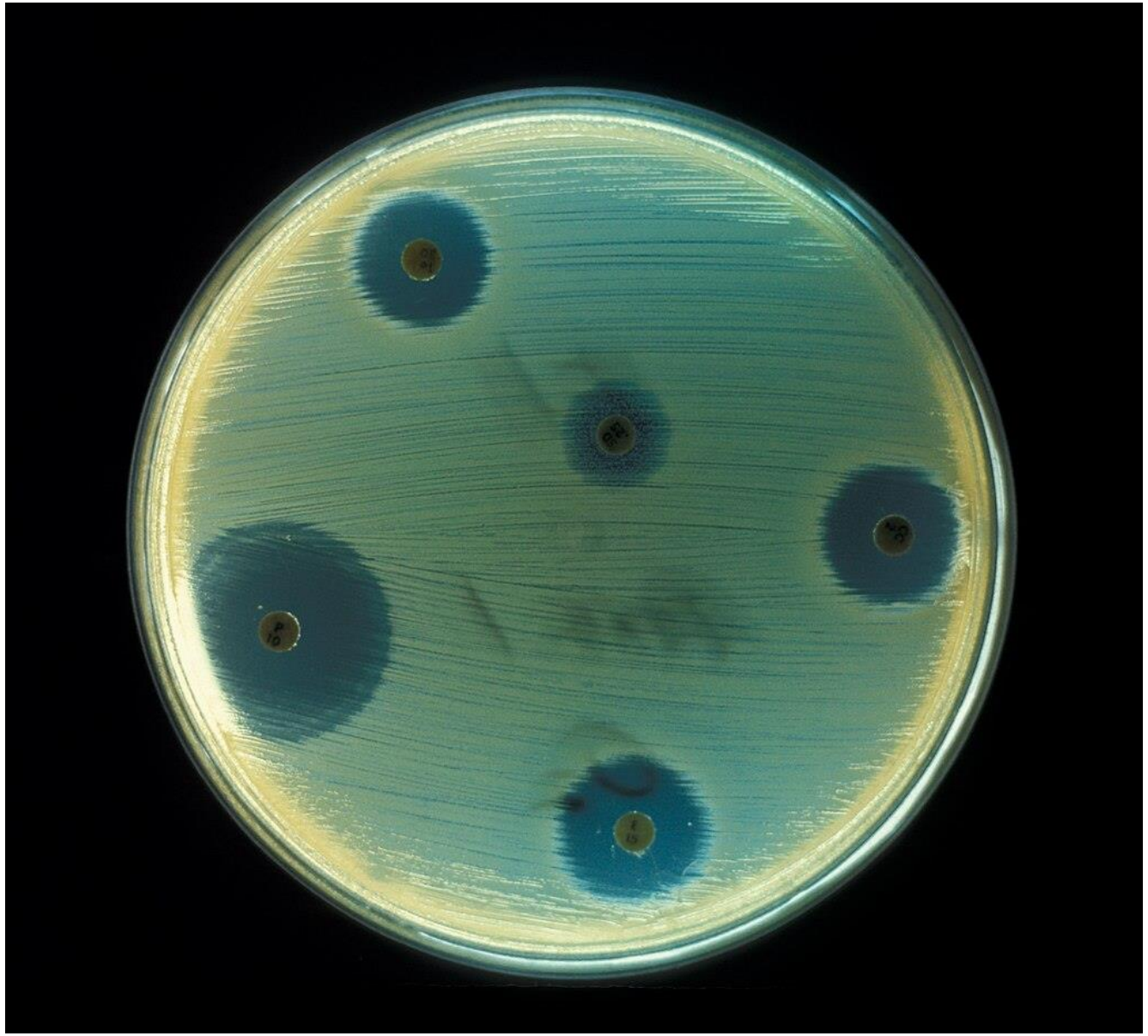
Sir Alexander Fleming



Sir Alexander Fleming (6 August 1881 – 11 March 1955) was a Scottish physician and microbiologist, best known for discovering the world's first broadly effective antibiotic substance, which he named penicillin. His discovery in 1928 of what was later named benzylpenicillin (or penicillin G) from the mould Penicillium rubens has been described as the "single greatest victory ever achieved over disease". For this discovery, he shared the Nobel Prize in Physiology or Medicine in 1945 with Howard Florey and Ernst Chain.

He also discovered the enzyme lysozyme from his nasal discharge in 1922, and along with it a bacterium he named Micrococcus lysodeikticus, later renamed Micrococcus luteus.

Sir Alexander Fleming



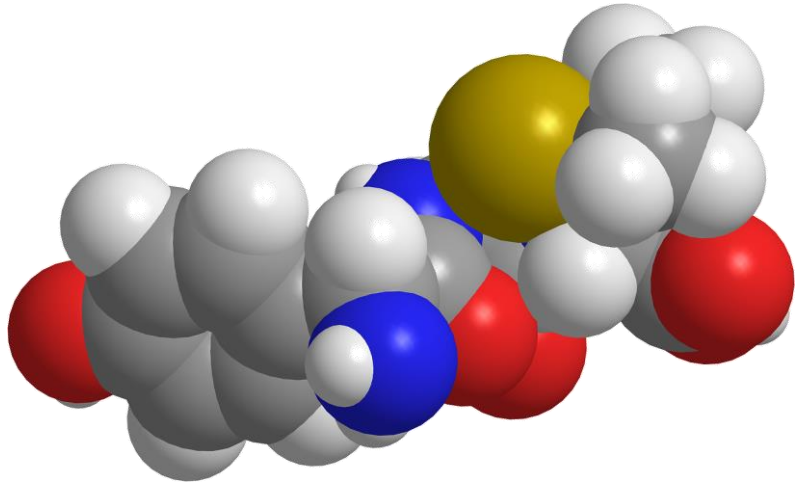
Modern antibiotics are tested using a method similar to Fleming's discovery.

Fleming was knighted for his scientific achievements in 1944. In 1999, he was named in Time magazine's list of the 100 Most Important People of the 20th century. In 2002, he was chosen in the BBC's television poll for determining the 100 Greatest Britons, and in 2009, he was also voted third "greatest Scot" in an opinion poll conducted by STV, behind only Robert Burns and William Wallace.

Sir Alexander Fleming

Early life and education

Born on 6 August 1881 at Lochfield farm near Darvel, in Ayrshire, Scotland, Alexander Fleming was the third of four children of farmer Hugh Fleming and Grace Stirling Morton, the daughter of a neighbouring farmer. Hugh Fleming had four surviving children from his first marriage. He was 59 at the time of his second marriage to Grace, and died when Alexander was seven.



Fleming went to Loudoun Moor School and Darvel School, and earned a two-year scholarship to Kilmarnock Academy before moving to London, where he attended the Royal Polytechnic Institution

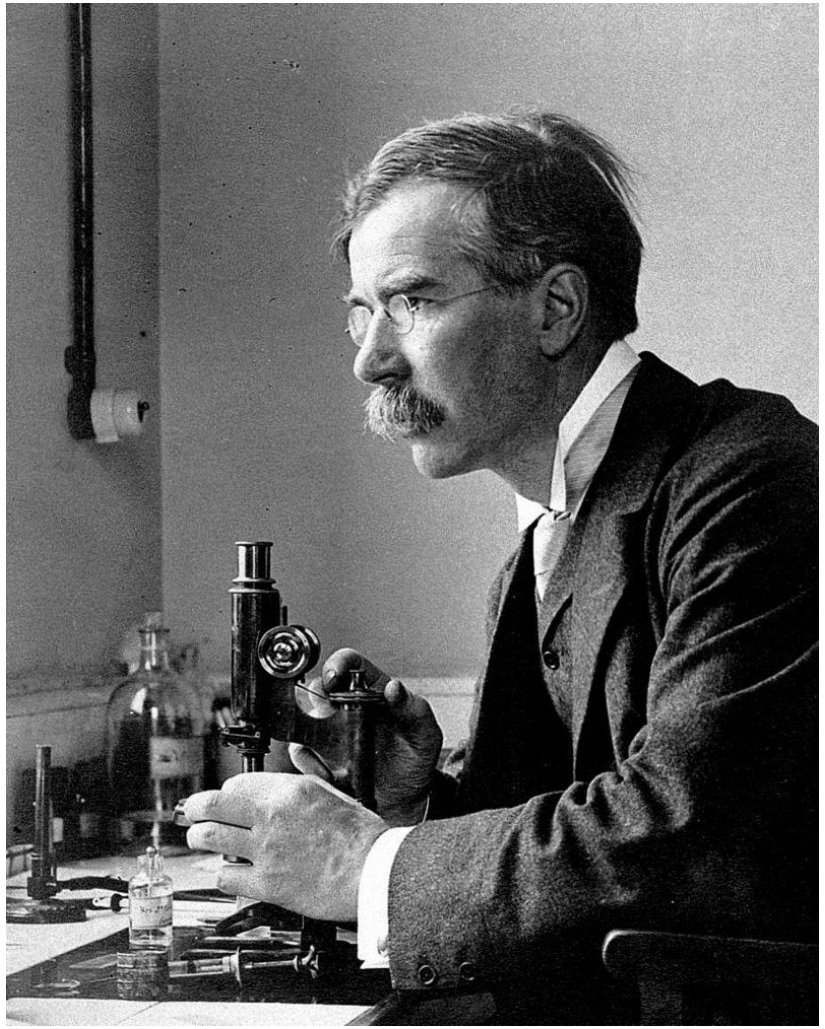
After working in a shipping office for four years, the twenty-year-old Alexander Fleming inherited some money from an uncle, John Fleming. His elder brother, Tom, was already a physician and suggested to him that he should follow the same career, and so in 1903, the younger Alexander enrolled at St Mary's Hospital Medical School in Paddington (now part of Imperial College London); he qualified with an MBBS degree from the school with distinction in 1906.

Sir Alexander Fleming

Fleming, who was a private in the London Scottish Regiment of the Volunteer Force from 1900 to 1914, had been a member of the rifle club at the medical school. The captain of the club, wishing to retain Fleming in the team, suggested that he join the research department at St Mary's, where he became assistant bacteriologist to Sir Almroth Wright, a pioneer in vaccine therapy and immunology. In 1908, he gained a BSc degree with gold medal in bacteriology, and became a lecturer at St Mary's until 1914.

Commissioned lieutenant in 1914 and promoted captain in 1917, Fleming served throughout World War I in the Royal Army Medical Corps, and was Mentioned in Dispatches. He and many of his colleagues worked in battlefield hospitals at the Western Front in France.

In 1918 he returned to St Mary's Hospital, where he was elected Professor of Bacteriology of the University of London in 1928. In 1951 he was elected the Rector of the University of Edinburgh for a term of three years



Almroth Wright

Sir Alexander Fleming

The London Scottish was a reserve infantry regiment then a company of the British Army. In its final incarnation it was A (The London Scottish) Company, the London Regiment until, on 1 May 2022, soldiers in the company transferred to foot guards regiments and the company became G (Messines) Company, Scots Guards, 1st Battalion London Guards.

Sir Alexander Fleming

The Royal Army Medical Corps (RAMC) was a specialist corps in the British Army which provided medical services to all Army personnel and their families, in war and in peace.

On 15 November 2024, the corps was amalgamated with the Royal Army Dental Corps and Queen Alexandra's Royal Army Nursing Corps to form the Royal Army Medical Service.

Sir Alexander Fleming

St Mary's Hospital is an NHS district general hospital in Paddington, in the City of Westminster, London, founded in 1845. Since the UK's first academic health science centre was created in 2008, it has been operated by Imperial College Healthcare NHS Trust, which also operates Charing Cross Hospital, Hammersmith Hospital, Queen Charlotte's and Chelsea Hospital and the Western Eye Hospital.

Until 1988 the hospital ran St Mary's Hospital Medical School, part of the federal University of London. In 1988 it merged with Imperial College London, and then with Charing Cross and Westminster Medical School in 1997 to form Imperial College School of Medicine. In 2007 Imperial College became an independent institution when it withdrew from the University of London.

Sir Alexander Fleming

St Mary´s Hospital London UK y 2017

Sir Alexander Fleming

The original block in Norfolk Place

Sir Alexander Fleming

Antiseptics

During World War I, Fleming with Leonard Colebrook and Sir Almroth Wright joined the war efforts and practically moved the entire Inoculation Department of St Mary's to the British military hospital at Boulogne-sur-Mer. Serving as a temporary lieutenant of the Royal Army Medical Corps, he witnessed the death of many soldiers from sepsis resulting from infected wounds. Antiseptics, which were used at the time to treat infected wounds, he observed, often worsened the injuries.

In an article published in the medical journal The Lancet in 1917, he described an ingenious experiment, which he was able to conduct as a result of his own glassblowing skills, in which he explained why antiseptics were killing more soldiers than infection itself during the war. Antiseptics worked well on the surface, but deep wounds tended to shelter anaerobic bacteria from the antiseptic agent, and antiseptics seemed to remove beneficial agents produced that protected the patients in these cases at least as well as they removed bacteria, and did nothing to remove the bacteria that were out of reach. Wright strongly supported Fleming's findings, but despite this, most army physicians over the course of the war continued to use antiseptics even in cases where this worsened the condition of the patients.

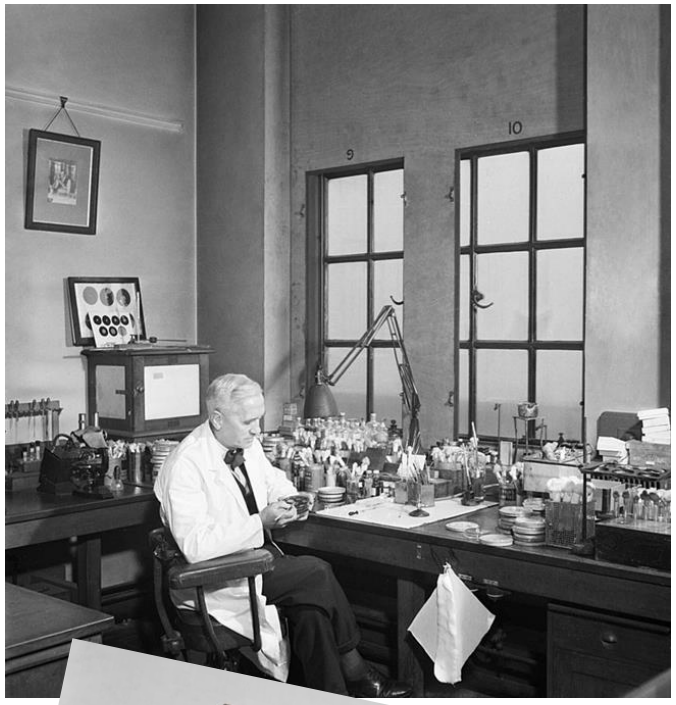
Discovery of lysozyme

At St Mary's Hospital, Fleming continued his investigations into bacteria culture and antibacterial substances. As his research scholar at the time V. D. Allison recalled, Fleming was not a tidy researcher and usually expected unusual bacterial growths in his culture plates

Sir Alexander Fleming

Fleming had teased Allison of his "excessive tidiness in the laboratory", and Allison rightly attributed such untidiness as the success of Fleming's experiments, and said, "[If] he had been as tidy as he thought I was, he would not have made his two great discoveries."

In late 1921, while Fleming was maintaining agar plates for bacteria, he found that one of the plates was contaminated with bacteria from the air. When he added nasal mucus, he found that the mucus inhibited the bacterial growth. Surrounding the mucus area was a clear transparent circle (1 cm from the mucus), indicating the killing zone of bacteria, followed by a glassy and translucent ring beyond which was an opaque area indicating normal bacterial growth. In the next test, he used bacteria maintained in saline that formed a yellow suspension. Within two minutes of adding fresh mucus, the yellow saline turned completely clear. He extended his tests using tears, which were contributed by his co-workers. As Allison reminisced, saying, "For the next five or six weeks, our tears were the source of supply for this extraordinary phenomenon. Many were the lemons we used (after the failure of onions) to produce a flow of tears... The demand by us for tears was so great, that laboratory attendants were pressed into service, receiving threepence for each contribution.



Sir Alexander Fleming

His further tests with sputum, cartilage, blood, semen, ovarian cyst fluid, pus, and egg white showed that the bactericidal agent was present in all of these. He reported his discovery before the Medical Research Club in December and before the Royal Society the next year but failed to stir any interest, as Allison recollected:

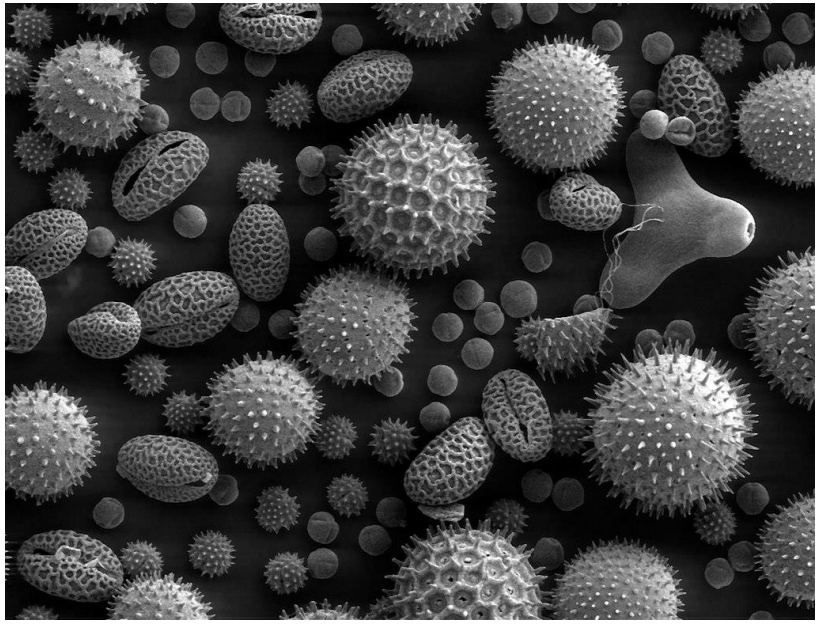
I was present at this [Medical Research Club] meeting as Fleming's guest. His paper describing his discovery was received with no questions asked and no discussion, which was most unusual and an indication that it was considered to be of no importance. The following year he read a paper on the subject before the Royal Society, Burlington House, Piccadilly and he and I gave a demonstration of our work. Again with one exception little comment or attention was paid to it.

Sir Alexander Fleming

Reporting in the 1 May 1922 issue of the Proceedings of the Royal Society B: Biological Sciences under the title "On a remarkable bacteriolytic element found in tissues and secretions", Fleming wrote:

In this communication I wish to draw attention to a substance present in the tissues and secretions of the body, which is capable of rapidly dissolving certain bacteria. As this substance has properties akin to those of ferments I have called it a "Lysozyme", and shall refer to it by this name throughout the communication. The lysozyme was first noticed during some investigations made on a patient suffering from acute coryza.

Rhinitis, also known as coryza, is irritation and inflammation of the mucous membrane inside the nose. Common symptoms are a stuffy nose, runny nose, sneezing, and post-nasal drip.
The inflammation is caused by viruses, bacteria, irritants or allergens. The most common kind of rhinitis is allergic rhinitis, which is usually triggered by airborne allergens such as pollen and dander. Rhinitis is categorized into three types (although infectious rhinitis is typically regarded as a separate clinical entity due to its transient nature)



Sir Alexander Fleming

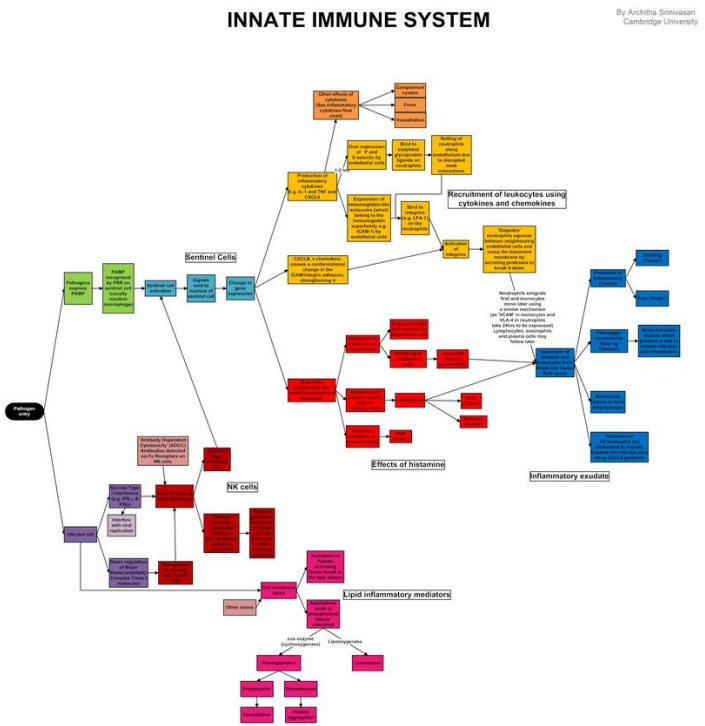
This was the first recorded discovery of lysozyme. With Allison, he published further studies on lysozyme in October issue of the British Journal of Experimental Pathology the same year. Although he was able to obtain larger amounts of lysozyme from egg whites, the enzyme was only effective against small counts of harmless bacteria, and therefore had little therapeutic potential. This indicates one of the major differences between pathogenic and harmless bacteria. Described in the original publication, "a patient suffering from acute coryza" was later identified as Fleming himself. His research notebook dated 21 November 1921 showed a sketch of the culture plate with a small note: "Staphyloid coccus from A.F.'s nose." He also identified the bacterium present in the nasal mucus as Micrococcus Lysodeikticus, giving the species name (meaning "lysis indicator" for its susceptibility to lysozymal activity). The species was reassigned as Micrococcus luteus in 1972. The "Fleming strain" (NCTC2665) of this bacterium has become a model in different biological studies. The importance of lysozyme was not recognised, and Fleming was well aware of this, in his presidential address at the Royal Society of Medicine meeting on 18 October 1932

he said:

I choose lysozyme as the subject for this address for two reasons, firstly because I have a fatherly interest in the name, and, secondly, because its importance in connection with natural immunity does not seem to be generally appreciated

Sir Alexander Fleming

In his Nobel lecture on 11 December 1945, he briefly mentioned lysozyme, saying, "Penicillin was not the first antibiotic I happened to discover." It was only towards the end of the 20th century that the true importance of Fleming's discovery in immunology was realised as lysozyme became the first antimicrobial protein discovered that constitute part of our innate immunity.



The innate immune system or nonspecific immune system is one of the two main immunity strategies in vertebrates (the other being the adaptive immune system). The innate immune system is an alternate defense strategy and is the dominant immune system response found in plants, fungi, prokaryotes, and invertebrates.
The major functions of the innate immune system are to:

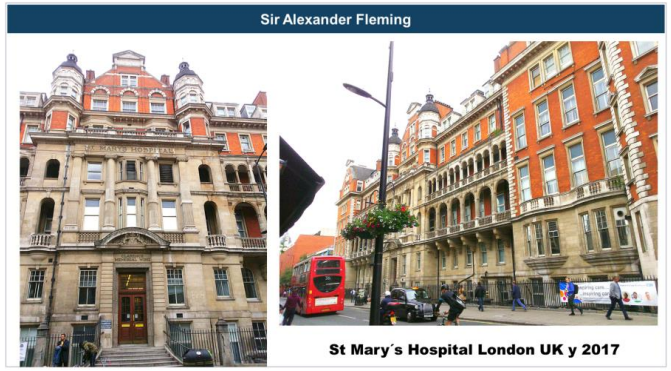
recruit immune cells to infection sites by producing chemical factors, including chemical mediators called cytokines
activate the complement cascade to identify bacteria, activate cells, and promote clearance of antibody complexes or dead cells
identify and remove foreign substances present in organs, tissues, blood and lymph, by specialized white blood cells
activate the adaptive immune system through antigen presentation
act as a physical and chemical barrier to infectious agents; via physical measures such as skin and mucus, and chemical measures such as clotting factors and host defence peptides.

Discovery of penicillin

Sir Alexander Fleming

The history of penicillin follows observations and discoveries of evidence of antibiotic activity of the mould Penicillium that led to the development of penicillins that became the first widely used antibiotics. Following the production of a relatively pure compound in 1942, penicillin was the first naturally-derived antibiotic.

Ancient societies used moulds to treat infections, and in the following centuries many people observed the inhibition of bacterial growth by moulds. While working at St Mary's Hospital in London in 1928, Scottish physician Alexander Fleming was the first to experimentally determine that a Penicillium mould secretes an antibacterial substance, which he named "penicillin". The mould was found to be a variant of Penicillium notatum (now called Penicillium rubens), a contaminant of a bacterial culture in his laboratory. The work on penicillin at St Mary's ended in 1929.



MEDICAL RESEARCH COUNCIL
British Standard Penicillin
Contents = approx. 30 mgm.
1 MGM. = 1800 INTERNATIONAL UNITS OF PENICILLIN
Supplied by The National Institute for Medical Research, N.W.7
Keep Dry. Store at 0°C. or below.

Sir Alexander Fleming

In 1939, a team of scientists at the Sir William Dunn School of Pathology at the University of Oxford, led by Howard Florey that included Edward Abraham, Ernst Chain, Mary Ethel Florey, Norman Heatley and Margaret Jennings, began researching penicillin. They developed a method for cultivating the mould and extracting, purifying and storing penicillin from it, together with an assay for measuring its purity. They carried out experiments on animals to determine penicillin's safety and effectiveness before conducting clinical trials and field tests. They derived penicillin's chemical structure and determined how it works. The private sector and the United States Department of Agriculture located and produced new strains and developed mass production techniques. During the Second World War penicillin became an important part of the Allied war effort, saving thousands of lives. Alexander Fleming, Howard Florey and Ernst Chain shared the 1945 Nobel Prize in Physiology or Medicine for the discovery and development of penicillin.

After the end of the war in 1945, penicillin became widely available. Dorothy Hodgkin determined its chemical structure, for which she received the Nobel Prize in Chemistry in 1964. This led to the development of semisynthetic penicillins that were more potent and effective against a wider range of bacteria. The drug was synthesised in 1957, but cultivation of mould remains the primary means of production. It was discovered that adding penicillin to animal feed increased weight gain, improved feed-conversion efficiency, promoted more uniform growth and facilitated disease control. Agriculture became a major user of penicillin. Shortly after their discovery of penicillin, the Oxford team reported penicillin resistance in many bacteria. Research that aims to circumvent and understand the mechanisms of antibiotic resistance continues today.

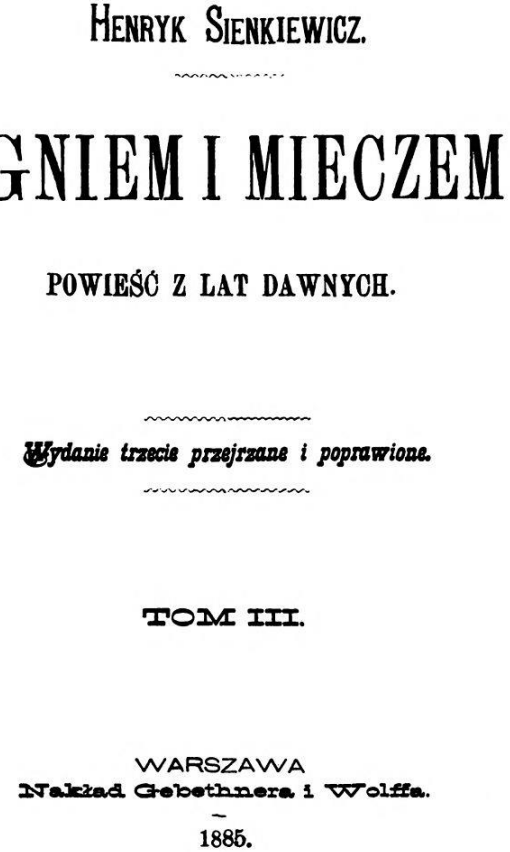
Sir Alexander Fleming

Many ancient cultures, including those in Australia, China, Egypt, Greece and India, independently discovered the useful properties of fungi and plants in treating infections. These treatments often worked because many organisms, including many species of mould, naturally produce antibiotics. However, ancient practitioners could not precisely identify or isolate the active components in these organisms.

In England in 1640, the idea of using mould as a form of medical treatment was recorded by apothecaries such as the botanist John Parkinson, who documented the use of moulds to treat infections in his book on pharmacology. In 17th-century Poland, wet bread was mixed with spider webs (which often contained fungal spores) to treat wounds. The technique was mentioned by Henryk Sienkiewicz in his 1884 novel With Fire and Sword.

John Parkinson (1567–1650; buried 6 August 1650) was the last of the great English herbalists and one of the first of the great English botanists. He was apothecary to James I and a founding member of the Worshipful Society of Apothecaries in December 1617, and was later Royal Botanist to Charles I. He is known for two monumental works, Paradisi in Sole Paradisus Terrestris (Park-in-Sun's Terrestrial Paradise, 1629), which generally describes the proper cultivation of plants; and Theatrum Botanicum (The Botanical Theatre or Theatre of Plants, 1640), the most complete and beautifully presented English treatise on plants of its time.

Sir Alexander Fleming



HENRYK SIENKIEWICZ.

OGNIEM I MIECZEM

POWIEŚĆ Z LAT DAWNYCH.

Wydanie trzecie przejrzane i poprawione.

TOM III.

WARSZAWA
Nakład Gebethnera i Wolffa.
1885.

By Fire and Sword (Polish: Ogniem i mieczem) is a historical novel by the Polish author Henryk Sienkiewicz, published in 1884. It is the first volume of a series known to Poles as The Trilogy, followed by The Deluge (Potop, 1886) and Fire in the Steppe (originally published under the Polish title Pan Wołodyjowski, which translates to Lord Wolodyjowski). The novel has been adapted as a film several times, most recently in 1999.

By Fire and Sword is a historical fiction novel, set in the 17th century in the Polish–Lithuanian Commonwealth during the Khmelnytsky Uprising.

Sir Alexander Fleming

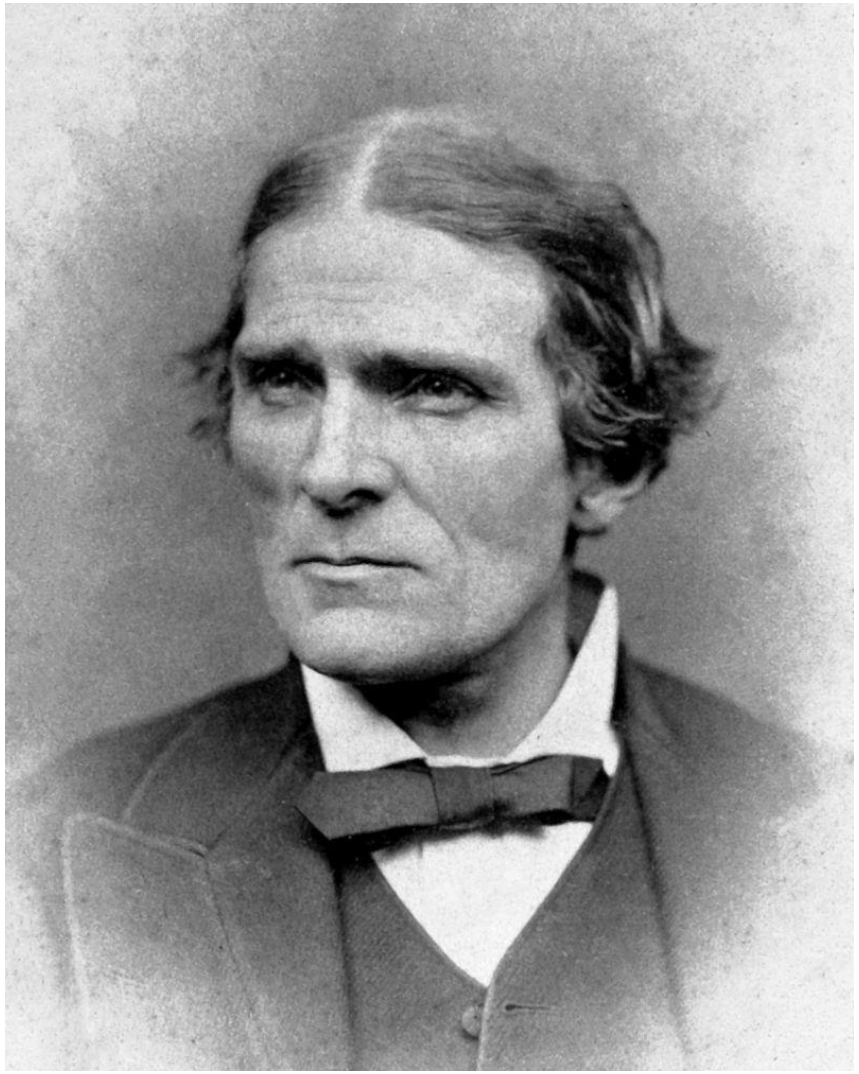
Henryk Adam Aleksander Pius; 5 May 1846 – 15 November 1916), also known by the pseudonym Litwos, was a Polish epic writer. He is remembered for his historical novels, such as the Trilogy series and especially for his internationally known best-seller Quo Vadis (1896).
Born into an impoverished Polish noble family in Russian-ruled Congress Poland, in the late 1860s he began publishing journalistic and literary pieces. In the late 1870s he traveled to the United States, sending back travel essays that won him popularity with Polish readers.

Many of his novels remain in print. In Poland he is known for his "Trilogy" of historical novels – With Fire and Sword, The Deluge, and Sir Michael – set in the 17th-century Polish–Lithuanian Commonwealth; internationally he is known for Quo Vadis, set in Nero's Rome. The Trilogy and Quo Vadis have been filmed, the latter several times, with Hollywood's 1951 version receiving the most international recognition.

Sir Alexander Fleming

Sir John Scott Burdon-Sanderson, 1st Baronet, FRS, HFRSE D.Sc. (21 December 1828 – 23 November 1905) was an English physiologist born near Newcastle upon Tyne, and a member of a well known Northumbrian family.

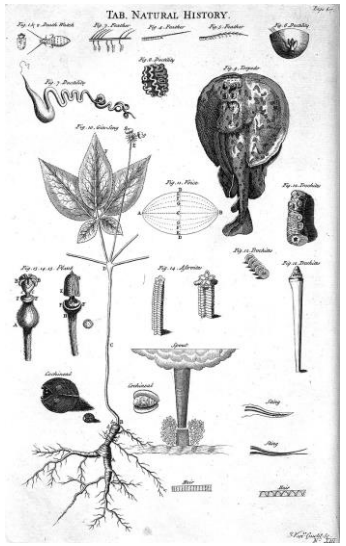
He reported that Penicillium inhibited the growth of bacteria, an observation which places him among the forerunners of Alexander Fleming.

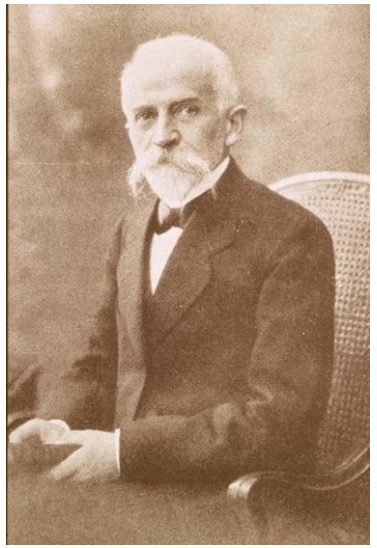


Sir Alexander Fleming

In 1871, Sir John Scott Burdon-Sanderson reported that culture fluid covered with mould would produce no bacterial growth. Joseph Lister, an English surgeon and the father of modern antisepsis, observed in November 1871 that urine samples contaminated with mould also did not permit the growth of bacteria. He also described the antibacterial action on human tissue of Penicillium glaucum but did not publish his results. In 1875 John Tyndall demonstrated to the Royal Society the antibacterial action of the Penicillium fungus.

In 1876, German biologist Robert Koch discovered that a bacterium (Bacillus anthracis) was the causative pathogen of anthrax, which became the first demonstration that a specific bacterium caused a specific disease and the first direct evidence of germ theory of diseases. In 1877, French biologists Louis Pasteur and Jules Francois Joubert observed that cultures of anthrax bacilli, when contaminated with other bacteria, could be successfully inhibited.





Sir Alexander Fleming

The phenomenon was described by Pasteur and Koch as antibacterial activity and was named antibiosis by French biologist Jean Paul Vuillemin in 1877. (The term antibiosis, meaning 'against life', was adopted as antibiotic by American biologist and later Nobel laureate Selman Waksman in 1947. However, Paul de Kruif's 1926 Microbe Hunters notes that Pasteur believed that this was contamination by other bacteria rather than by mould. In 1887, Swiss physician Carl Garré developed a test method using glass plate to see bacterial inhibition and found similar results. Using his gelatin-based culture plate, he grew two different species of bacteria and found that their growths were inhibited differently, as he reported:

I inoculated on the untouched cooled [gelatin] plate alternate parallel strokes of B. fluorescens [Pseudomonas fluorescens] and Staph. pyogenes [Streptococcus pyogenes]... B. fluorescens grew more quickly... [This] is not a question of overgrowth or crowding out of one by another quicker-growing species, as in a garden where luxuriantly growing weeds kill the delicate plants. Nor is it due to the utilization of the available foodstuff by the more quickly growing organisms, rather there is an antagonism caused by the secretion of specific, easily diffusible substances which are inhibitory to the growth of some species but completely ineffective against others.

Sir Alexander Fleming

Vincenzo Tiberio (May 1, 1869 – January 7, 1915) was an Italian researcher and medical officer of the Medical Corps of the Italian Navy and physician at the University of Naples. Observing that people complained of intestinal disorders after the walls of a well which supplied drinking water was cleaned off, he published a little noticed 1895 paper on the bactericidal effect of some molds, 35 years before Alexander Fleming's discovery of penicillin.

hich Tiberius confirmed through in vivo experimentation, both on guinea pigs and rabbits. The research done by Vincenzo Tiberio was a complete scientific cycle of experiments. Starting from observation, the proving of the initial hypothesis, and also the preparation of the antibiotic substance to show its effect in vitro and in vivo. He also managed to evaluate the effective doses and time of the antibiotic efficacy. In 1895 he published the results of his experiments in an Italian medical journal, but the work was disregarded as coincidence and received no further study.

Sir Alexander Fleming

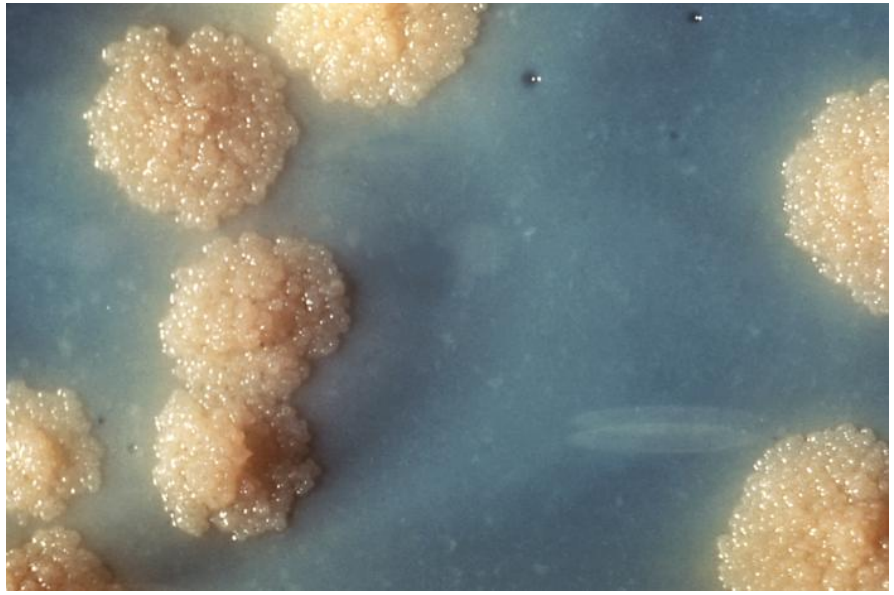
In 1895, Vincenzo Tiberio, an Italian physician at the University of Naples, published research on moulds initially found in a water well in Arzano; from his observations, he concluded that these moulds contained soluble substances having antibacterial action. Two years later, Ernest Duchesne at École du Service de Santé Militaire in Lyon independently discovered the healing properties of a P. glaucum mould, even curing infected guinea pigs of typhoid. He published his results in a dissertation in 1897.

Duchesne was using a discovery made earlier by Arab stable boys, who used moulds to cure sores on horses. He did not claim that the mould contained any antibacterial substance, only that the mould somehow protected the animals.

Penicillin does not cure typhoid and so it remains unknown which substance might have been responsible. A Pasteur Institute scientist, Costa Rican Clodomiro Picado Twight, similarly recorded the antibiotic effect of Penicillium in 1923. In these early stages of penicillin research, most species of Penicillium were non-specifically referred to as P. glaucum, so that it is impossible to know the exact species and that it was really penicillin that prevented bacterial grow

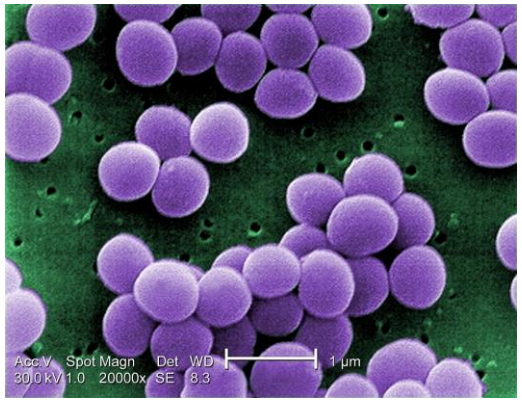
Sir Alexander Fleming

Andre Gratia and Sara Dath at the Free University of Brussels studied the effects of mould samples on bacteria. In 1924, they found that dead Staphylococcus aureus cultures were contaminated by a mould, a streptomycete. Upon further experimentation, they showed that the mould extract could kill not only S. aureus, but also Pseudomonas aeruginosa, Mycobacterium tuberculosis and Escherichia coli. Gratia called the antibacterial agent "mycolysate". The next year they found another killer mould that could inhibit B. anthracis. Reporting in Comptes rendus des séances de la Société de Biologie et de ses filiales, they identified the mould as P. glaucum. But these findings received little attention as the antibacterial agent and its medical value were not fully understood, and Gratia's samples were lost



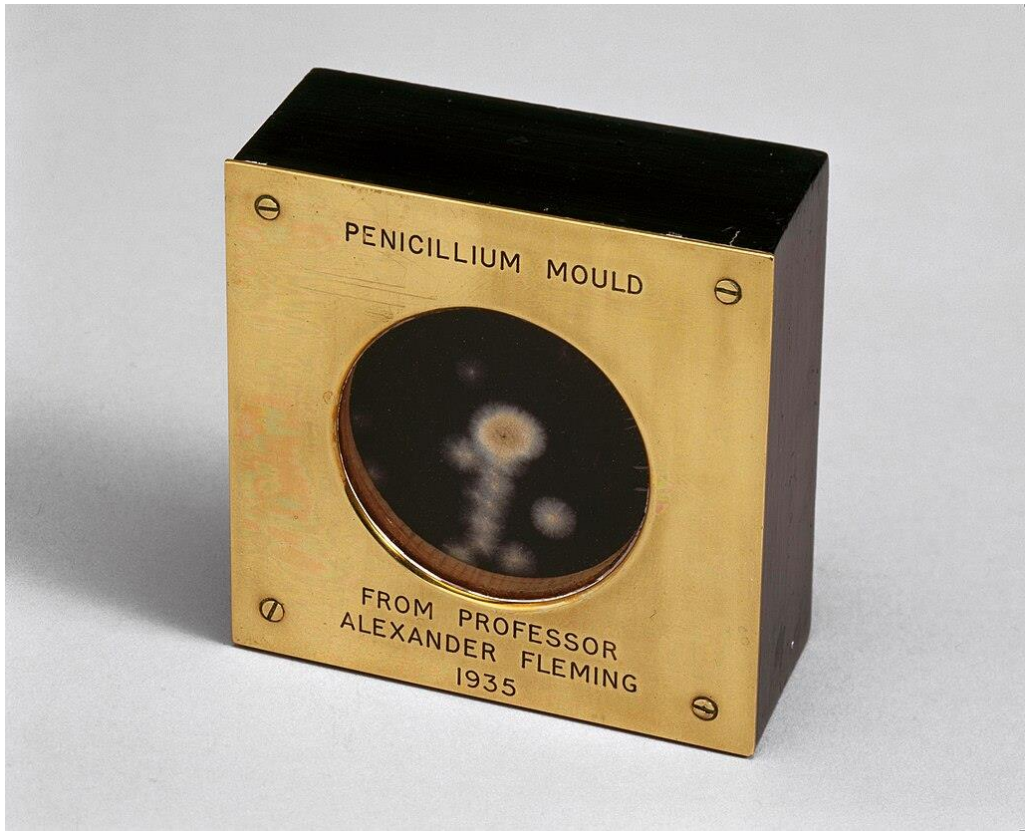
This is a close-up of a Mycobacterium tuberculosis culture revealing this organism's colonial morphology. Note the colorless rough surface, which are typical morphologic characteristics seen in Mycobacterium tuberculosis colonial growth. Macroscopic examination of colonial growth patterns is still one of the ways microorganisms are often identified.

Under a very high magnification of 20,000x, this scanning electron micrograph (SEM) shows a strain of Staphylococcus aureus bacteria taken from a vancomycin intermediate resistant culture (VISA).



Sir Alexander Fleming

St Mary's Hospital showing Fleming's lab and Praed Street



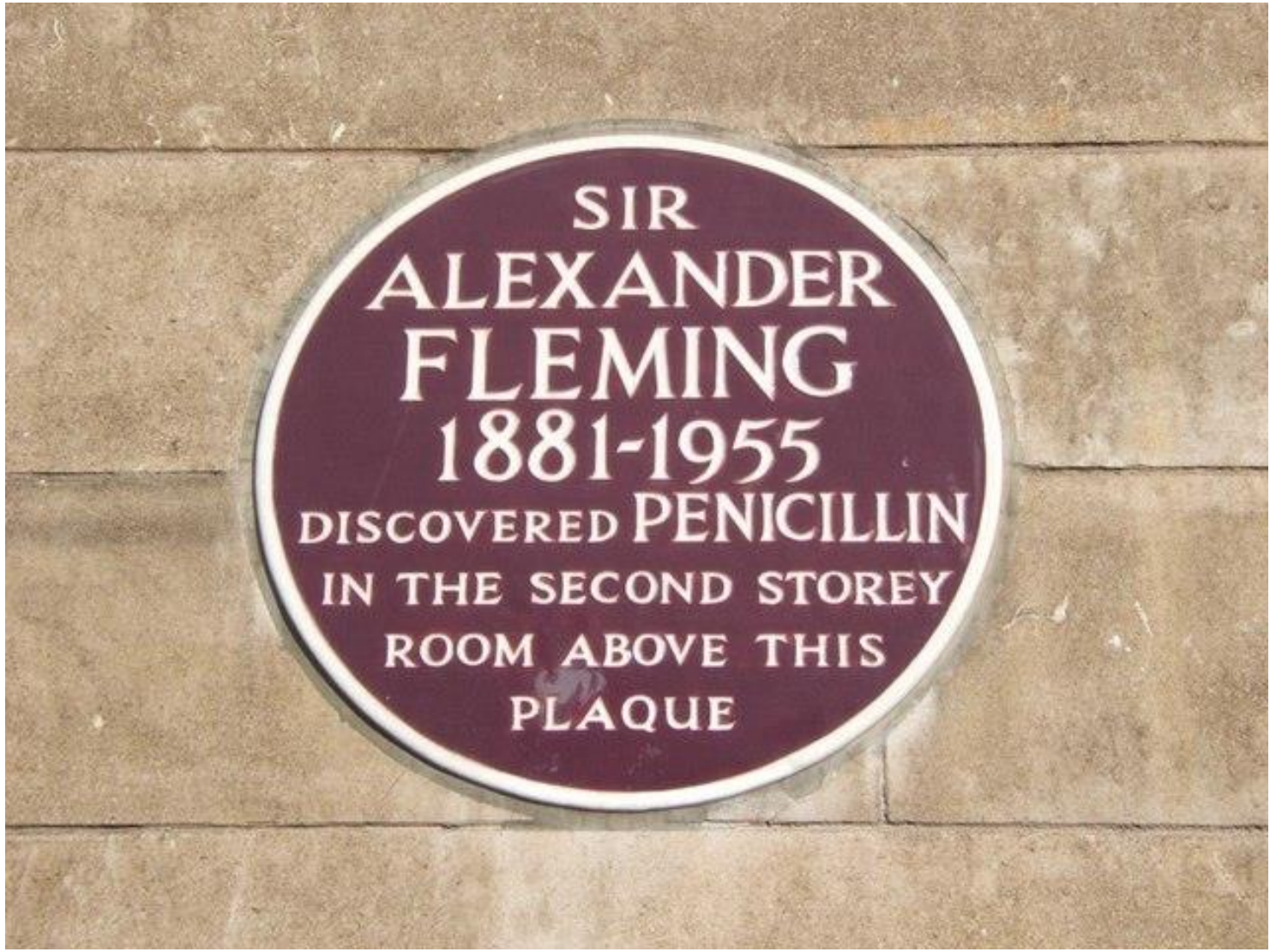
Sample of penicillin mould presented by Alexander Fleming to Douglas Macleod in 1935

Sir Alexander Fleming

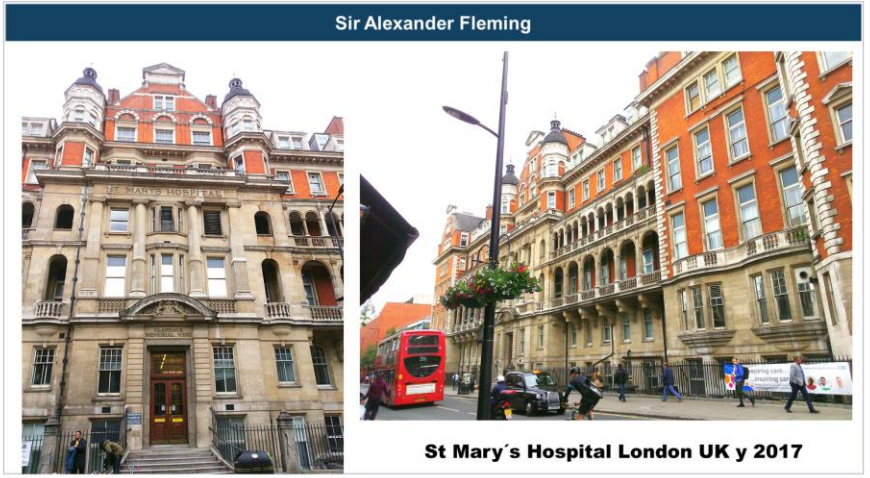
By 1927, Fleming had been investigating the properties of staphylococci. He was already well known from his earlier work, and had developed a reputation as a brilliant researcher. In 1928, he studied the variation of Staphylococcus aureus grown under natural condition, after the work of Joseph Warwick Bigger, who discovered that the bacterium could grow into a variety of types (strains). On 3 September 1928, Fleming returned to his laboratory having spent a holiday with his family at Suffolk. Before leaving for his holiday, he inoculated staphylococci on culture plates and left them on a bench in a corner of his laboratory.
On his return, Fleming noticed that one culture was contaminated with a fungus, and that the colonies of staphylococci immediately surrounding the fungus had been destroyed, whereas other staphylococci colonies farther away were normal, famously remarking "That's funny"Fleming showed the contaminated culture to his former assistant Merlin Pryce, who reminded him, "That's how you discovered lysozyme

He identified the mould as being from the genus Penicillium. He suspected it to be P. chrysogenum, but a colleague Charles J. La Touche identified it as P. rubrum. (It was later corrected as P. notatum and then officially accepted as P. chrysogenum; in 2011, it was resolved as P. rubens.)

Sir Alexander Fleming



The laboratory in which Fleming discovered and tested penicillin is preserved as the Alexander Fleming Laboratory Museum in St. Mary's Hospital, Paddington. The source of the fungal contaminant was established in 1966 as coming from La Touche's room, which was directly below Fleming's.



Sir Alexander Fleming

Fleming grew the mould in a pure culture and found that the culture broth contained an antibacterial substance. He investigated its anti-bacterial effect on many organisms, and noticed that it affected bacteria such as staphylococci and many other Gram-positive pathogens that cause scarlet fever, pneumonia, meningitis and diphtheria, but not typhoid fever or paratyphoid fever, which are caused by Gram-negative bacteria, for which he was seeking a cure at the time. It also affected Neisseria gonorrhoeae, which causes gonorrhoea, although this bacterium is Gram-negative. After some months of calling it "mould juice" or "the inhibitor", he gave the name penicillin on 7 March 1929 for the antibacterial substance present in the mould.

Reception and publication

Fleming presented his discovery on 13 February 1929 before the Medical Research Club. His talk on "A medium for the isolation of Pfeiffer's bacillus" did not receive any particular attention or comment. Henry Dale, the then Director of National Institute for Medical Research and chair of the meeting, much later reminisced that he did not even sense any striking point of importance in Fleming's speech. Fleming published his discovery in 1929 in the British Journal of Experimental Pathology, but little attention was paid to the article. His problem was the difficulty of producing penicillin in large amounts, and moreover, isolation of the main compound. Even with the help of Harold Raistrick and his team of biochemists at the London School of Hygiene & Tropical Medicine, chemical purification was futile. "As a result, penicillin languished largely forgotten in the 1930s", as Milton Wainwright described.

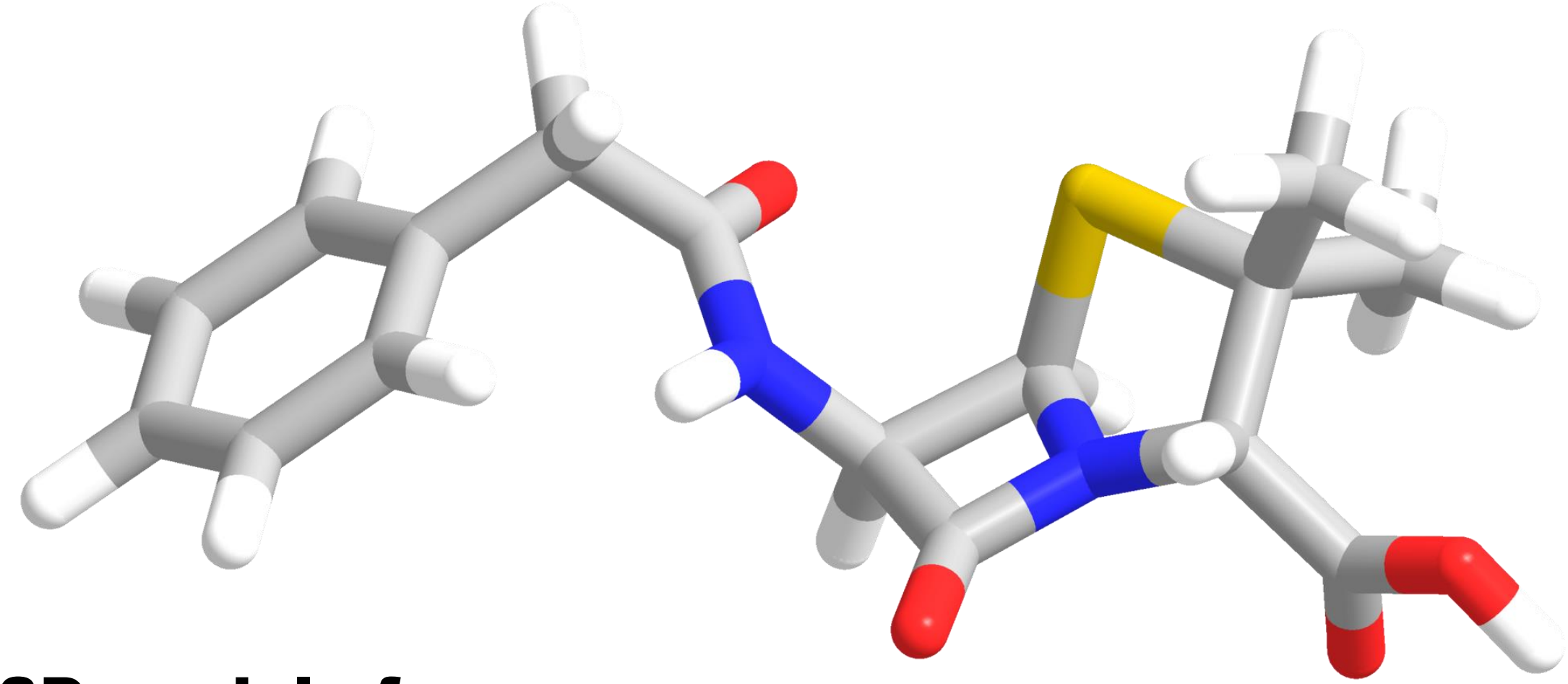
Sir Alexander Fleming

As late as in 1936, there was no appreciation for penicillin. When Fleming talked of its medical importance at the Second International Congress of Microbiology held in London, no one believed him. As Allison, his companion in both the Medical Research Club and international congress meeting, remarked the two occasions:

[Fleming at the Medical Research Club meeting] suggested the possible value of penicillin for the treatment of infection in man. Again there was a total lack of interest and no discussion. Fleming was keenly disappointed, but worse was to follow. He read a paper on his work on penicillin at a meeting of the International Congress of Microbiology, attended by the foremost bacteriologists from all over the world. There was no support for his views on its possible future value for the prevention and treatment of human infections and discussion was minimal. Fleming bore these disappointments stoically, but they did not alter his views or deter him from continuing his investigation of penicillin.

In 1941, the British Medical Journal reported that "[Penicillin] does not appear to have been considered as possibly useful from any other point of view.

Sir Alexander Fleming



3D-model of benzylpenicillin

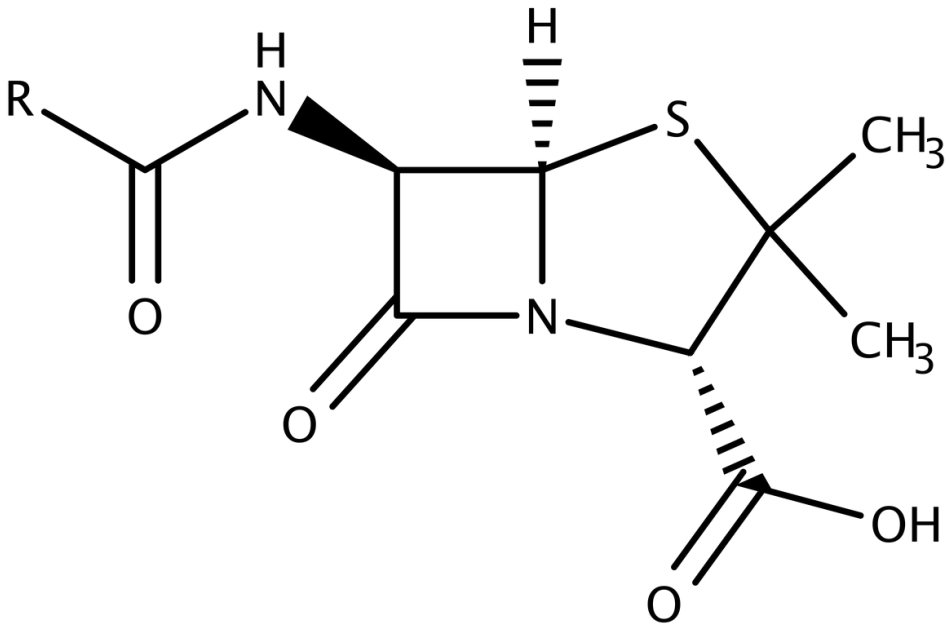
Sir Alexander Fleming

In Oxford, Ernst Chain and Edward Abraham were studying the molecular structure of the antibiotic. Abraham was the first to propose the correct structure of penicillin. Shortly after the team published its first results in 1940, Fleming telephoned Howard Florey, Chain's head of department, to say that he would be visiting within the next few days. When Chain heard that Fleming was coming, he remarked "Good God! I thought he was dead.

Norman Heatley suggested transferring the active ingredient of penicillin back into water by changing its acidity. This produced enough of the drug to begin testing on animals. There were many more people involved in the Oxford team, and at one point the entire Sir William Dunn School of Pathology was involved in its production. After the team had developed a method of purifying penicillin to an effective first stable form in 1940, several clinical trials ensued, and their amazing success inspired the team to develop methods for mass production and mass distribution in 1945. Fleming was modest about his part in the development of penicillin, describing his fame as the "Fleming Myth" and he praised Florey and Chain for transforming the laboratory curiosity into a practical drug.

Fleming was the first to discover the properties of the active substance, giving him the privilege of naming it: penicillin. He also kept, grew, and distributed the original mould for twelve years, and continued until 1940 to try to get help from any chemist who had enough skill to make penicillin. Sir Henry Harris summed up the process in 1998 as: "Without Fleming, no Chain; without Chain, no Florey; without Florey, no Heatley; without Heatley, no penicillin." The discovery of penicillin and its subsequent development as a prescription drug mark the start of modern antibiotics.

Sir Alexander Fleming



Medical use and mass production
In his first clinical trial, Fleming treated his research scholar Stuart Craddock who had developed severe infection of the nasal antrum (sinusitis). The treatment started on 9 January 1929 but without any effect. It probably was due to the fact that the infection was with influenza bacillus (Haemophilus influenzae), the bacterium which he had found unsusceptible to penicillin.

Fleming gave some of his original penicillin samples to his colleague-surgeon Arthur Dickson Wright for clinical test in 1928. Although Wright reportedly said that it "seemed to work satisfactorily", there are no records of its specific use. Cecil George Paine, a pathologist at the Royal Infirmary in Sheffield and former student of Fleming, was the first to use penicillin successfully for medical treatment. He cured eye infections (conjunctivitis) of one adult and three infants (neonatal conjunctivitis) on 25 November 1930

Sir Alexander Fleming

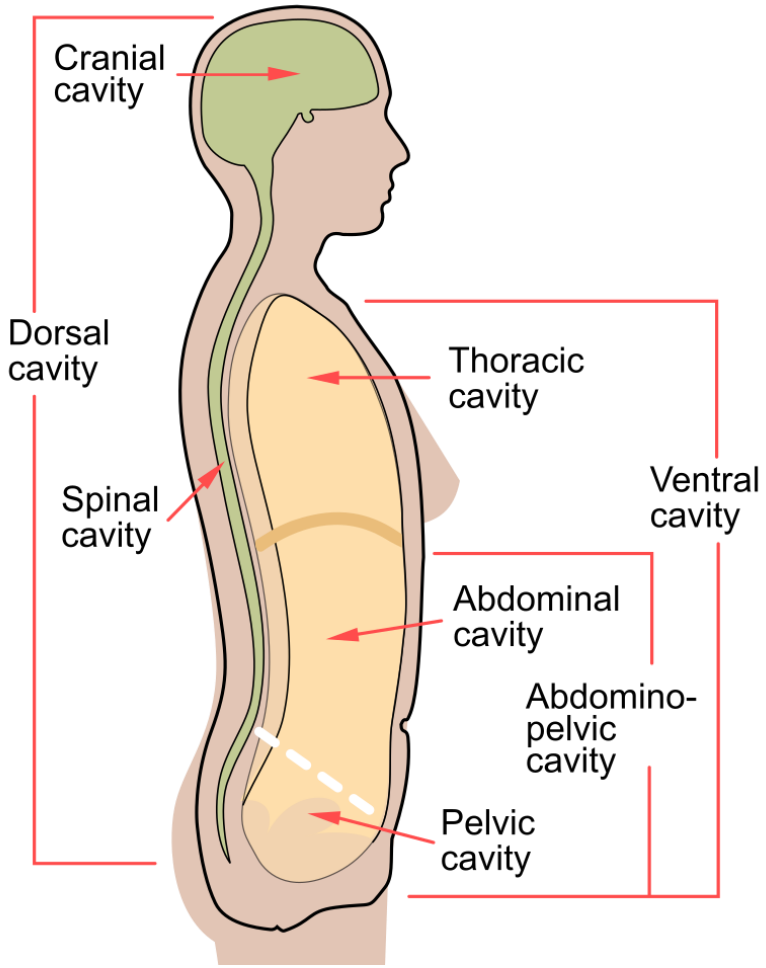
Fleming also successfully treated severe conjunctivitis in 1932. Keith Bernard Rogers, who had joined St Mary's as medical student in 1929, was captain of the London University rifle team and was about to participate in an inter-hospital rifle shooting competition when he developed conjunctivitis. Fleming applied his penicillin and cured Rogers before the competition. It is said that the "penicillin worked and the match was won." However, the report that "Keith was probably the first patient to be treated clinically with penicillin ointment" is no longer true as Paine's medical records showed up.

There is a popular assertion both in popular and scientific literature that Fleming largely abandoned penicillin work in the early 1930s. In his review of André Maurois's The Life of Sir Alexander Fleming, Discoverer of Penicillin, William L. Kissick went so far as to say that "Fleming had abandoned penicillin in 1932... Although the recipient of many honors and the author of much scientific work, Sir Alexander Fleming does not appear to be an ideal subject for a biography." This is false, as Fleming continued to pursue penicillin research. As late as in 1939, Fleming's notebook shows attempts to make better penicillin production using different media. In 1941, he published a method for assessment of penicillin effectiveness. As to the chemical isolation and purification, Howard Florey and Ernst Chain at the Radcliffe Infirmary in Oxford took up the research to mass-produce it, which they achieved with support from World War II military projects under the British and US governments.
By mid-1942, the Oxford team produced the pure penicillin compound as yellow powder. In August 1942, Harry Lambert (an associate of Fleming's brother Robert) was admitted to St Mary's Hospital due to a life-threatening infection of the nervous system (streptococcal meningitis).

Sir Alexander Fleming

Fleming treated him with sulphonamides, but Lambert's condition deteriorated. He tested the antibiotic susceptibility and found that his penicillin could kill the bacteria. He requested Florey for the isolated sample. Florey sent the incompletely purified sample, which Fleming immediately administered into Lambert's spinal canal. Lambert showed signs of improvement the very next day, and completely recovered within a week. Fleming published the clinical case in The Lancet in 1943.

Upon this medical breakthrough, Allison informed the British Ministry of Health of the importance of penicillin and the need for mass production. The War Cabinet was convinced of the usefulness upon which Sir Cecil Weir, Director General of Equipment, called for a meeting on the mode of action on 28 September 1942. The Penicillin Committee was created on 5 April 1943. The committee consisted of Weir as chairman, Fleming, Florey, Sir Percival Hartley, Allison and representatives from pharmaceutical companies as members. The main goals were to produce penicillin rapidly in large quantities with collaboration of American companies, and to supply the drug exclusively for Allied armed forces. By D-Day in 1944, enough penicillin had been produced to treat all the wounded of the Allied troops



Sir Alexander Fleming

Fleming also discovered very early that bacteria developed antibiotic resistance whenever too little penicillin was used or when it was used for too short a period. Almroth Wright had predicted antibiotic resistance even before it was noticed during experiments. Fleming cautioned about the use of penicillin in his many speeches around the world. On 26 June 1945, he made the following cautionary statements: "the microbes are educated to resist penicillin and a host of penicillin-fast organisms is bred out ... In such cases the thoughtless person playing with penicillin is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism. I hope this evil can be averted." He cautioned not to use penicillin unless there was a properly diagnosed reason for it to be used, and that if it were used, never to use too little, or for too short a period, since these are the circumstances under which bacterial resistance to antibiotics develops.

It had been experimentally shown in 1942 that S. aureus could develop penicillin resistance under prolonged exposure. Elaborating the possibility of penicillin resistance in clinical conditions in his Nobel Lecture, Fleming said:

The time may come when penicillin can be bought by anyone in the shops. Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant.

It was around that time that the first clinical case of penicillin resistance was reported.

Sir Alexander Fleming

Personal life

On 24 December 1915, Fleming married a trained nurse, Sarah Marion McElroy of Killala, County Mayo, Ireland. Their only child, Robert Fleming (1924–2015), became a general medical practitioner. After his first wife's death in 1949, Fleming married Amalia Koutsouri-Vourekas, a Greek colleague at St. Mary's, on 9 April 1953; she died in 1986.

Fleming came from a Presbyterian background, while his first wife Sarah was a (lapsed) Roman Catholic. It is said that he was not particularly religious, and their son Robert was later received into the Anglican church, while still reportedly inheriting his two parents' fairly irreligious disposition.

When Fleming learned of Robert D. Coghill and Andrew J. Moyer patenting the method of penicillin production in the United States in 1944, he was furious, and commented:

I found penicillin and have given it free for the benefit of humanity. Why should it become a profit-making monopoly of manufacturers in another country?

From 1921 until his death in 1955, Fleming owned a country home named "The Dhoon" in Barton Mills, Suffolk.

Sir Alexander Fleming

On 11 March 1955, Fleming died at his home in London of a heart attack. His ashes are buried in St Paul's Cathedral.

Awards and legacy

Fleming's discovery of penicillin changed the world of modern medicine by introducing the age of useful antibiotics; penicillin has saved, and is still saving, millions of people around the world.

The laboratory at St Mary's Hospital where Fleming discovered penicillin is home to the Fleming Museum, a popular London attraction. His alma mater, St Mary's Hospital Medical School, merged with Imperial College London in 1988. The Sir Alexander Fleming Building on the South Kensington campus was opened in 1998, where his son Robert and his great-granddaughter Claire were presented to the Queen; it is now one of the main preclinical teaching sites of the Imperial College School of Medicine. His other alma mater, the Royal Polytechnic Institution (now the University of Westminster) has named one of its student halls of residence Alexander Fleming House, which is near to Old Street.

Sir Alexander Fleming (centre) receiving the Nobel prize from King Gustaf V of Sweden (right) in 1945

Sir Alexander Fleming

Sir Alexander Fleming (centre) receiving the Nobel prize from King Gustaf V of Sweden (right) in 1945

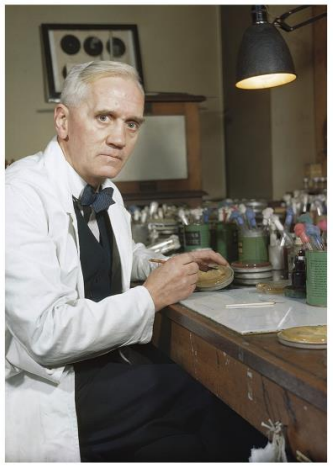
Sir Alexander Fleming

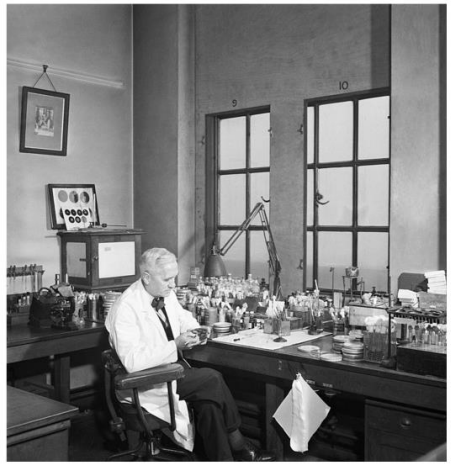
Sir Alexander Fleming (centre) receiving the Nobel prize from King Gustaf V of Sweden (right) in 1945

Sir Alexander Fleming

Fleming, Florey and Chain jointly received the Nobel Prize in Medicine in 1945. According to the rules of the Nobel committee, a maximum of three people may share the prize. Fleming's Nobel Prize medal was acquired by the National Museums of Scotland in 1989 and is on display after the museum re-opened in 2011. He was a member of the Pontifical Academy of Sciences.

He was elected a Fellow of the Royal Society (FRS) in 1943.
He was awarded the Hunterian Professorship by the Royal College of Surgeons of England.
He was knighted as a Knight Bachelor by King George VI in 1944.
He was awarded the Medal for Merit by the President of the United States.
He was made a Grand Cross of the Legion of Honour by the French Republic.
He was made a Grand Cross of the Order of the Phoenix of Greece.
He was made a Knight Grand Cross of the Order of Alfonso X the Wise (Spain) in 1948.
In 1999, Time magazine named Fleming one of the 100 Most Important People of the 20th century

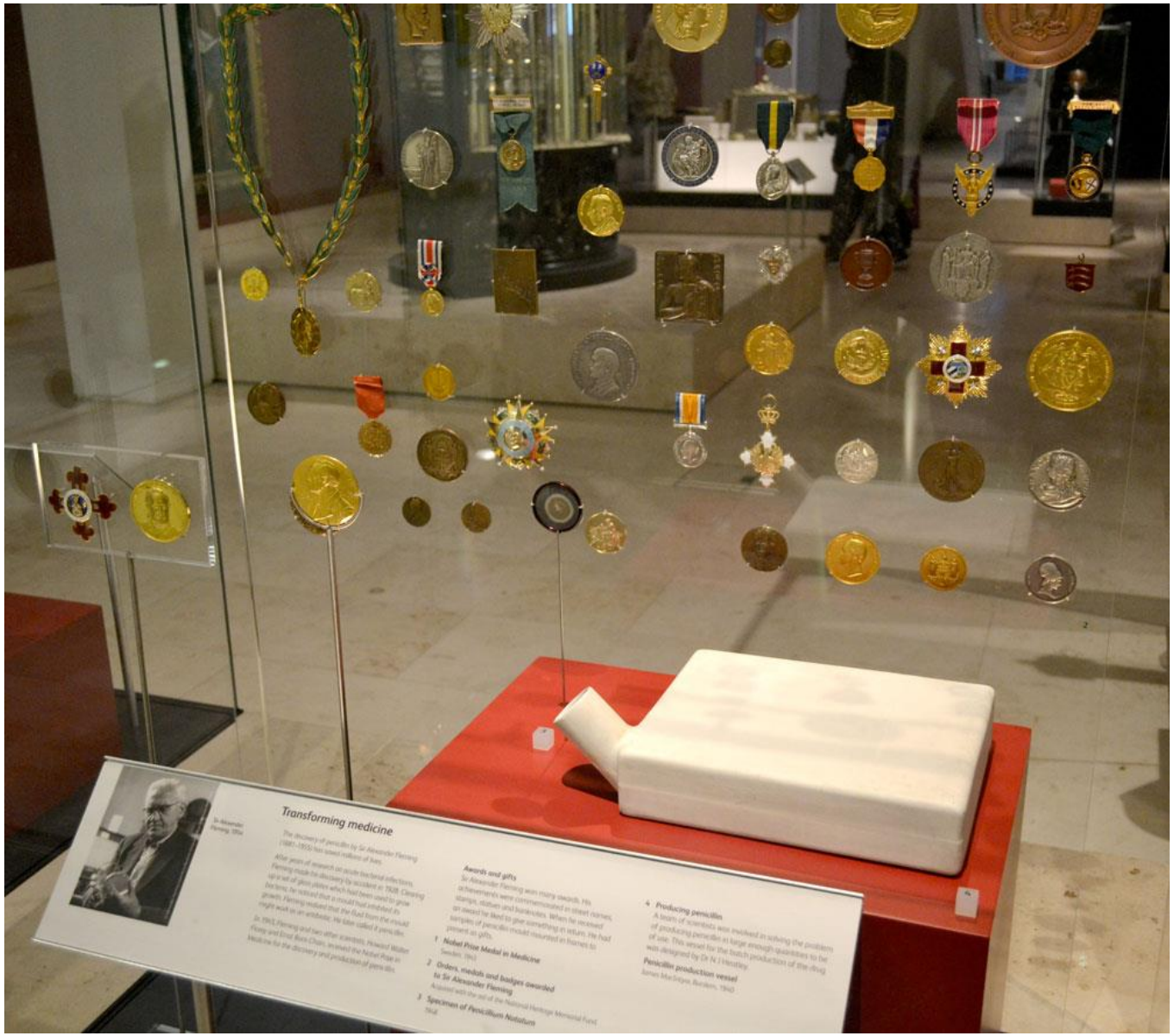




Sir Alexander Fleming

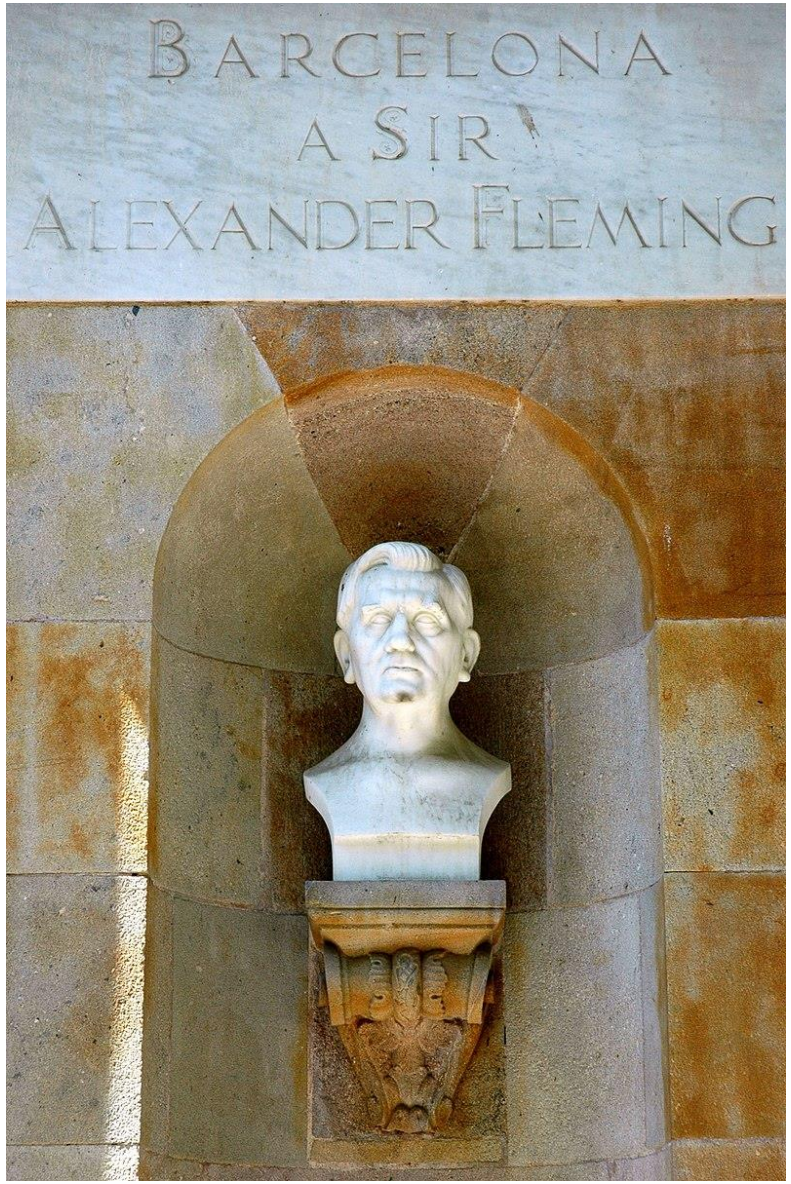
Best known for discovering the world's first broadly effective antibiotic substance, which he named penicillin.

Sir Alexander Fleming



Display of Fleming's awards, including his Nobel Prize. Also shows a sample of penicillin and an example of an early apparatus for preparing it.

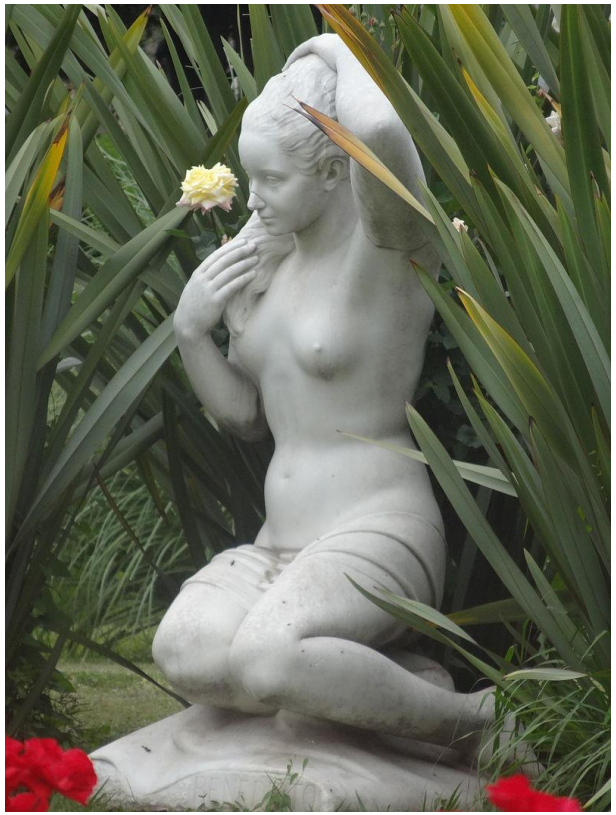
Sir Alexander Fleming



Barcelona to Sir Alexander Fleming (1956), by Catalan sculptor Josep Manuel Benedicto. Barcelona: jardins del Doctor Fleming.

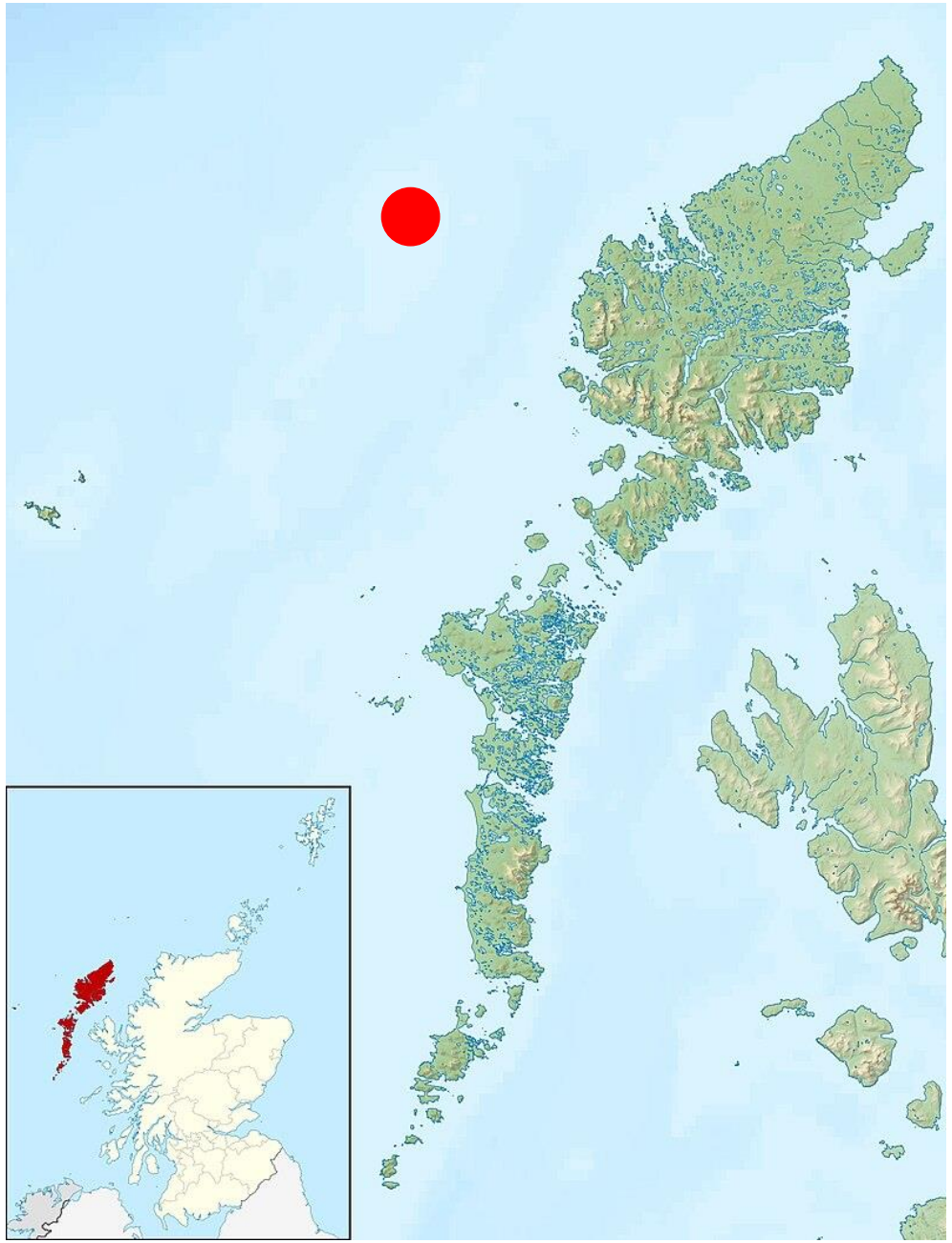
Josep Manuel Benedicto.
He was a disciple of Manuel Fuxá, Antonio Alsina and Antonio Parera. In a classicist style, he created various works of public art in Barcelona

To Alexander Fleming (1955), in the Doctor Fleming Gardens, next to the Hospital of the Holy Cross, a marble bust of the discoverer of penicillin, located on a fountain.



Flannan Isles Lighthouse

Flannan Isles Lighthouse is a lighthouse near the highest point on Eilean Mòr, one of the Flannan Isles in the Outer Hebrides off the west coast of Scotland. 1900 crew disappearance



The islands are split into three groups: the main cluster of rocks that lie to the northeast include the two principal islands of Eilean Mòr (Big Isle), which is approximately 17.5 hectares (43 acres) in extent, and Eilean Taighe (House Isle). To the south lie Soray/Soraigh (Old Norse Suðurey, south island or Sauðurey, sheep's island) and Sgeir Tomain (probably from Old Norse sker, skerry, shallow rock in sea, and Gaelic tuaman, grave or mound) while the main western outcrops are Eilean a' Ghobha (Isle of the Blacksmith), Roaireim (which has a natural rock arch), and Bròna Cleit (Sad Sunk Rock). The total land area amounts to approximately 50 hectares (125 acres) and the highest point is 88 metres (289 ft) above sea level on Eilean Mòr.

The Flannan Isles (Scottish Gaelic: Na h-Eileanan Flannach) or the Seven Hunters are a small island group in the Outer Hebrides of Scotland, approximately 32 kilometres (17+1⁄2 nautical miles) west of the Isle of Lewis. They may take their name from Saint Flannan, the 7th century Irish preacher and abbot.
In December 1900, all three lighthouse keepers vanished in mysterious circumstances. An official inquiry concluded that the three men had probably been swept away and lost at sea in rough weather while attending some equipment near the cliff edge.

The 23-metre (75 ft) lighthouse was designed by David Alan Stevenson for the Northern Lighthouse Board (NLB). Construction, between 1895 and 1899, was undertaken by George Lawson of Rutherglen at a cost of £1,899 (equivalent to £277,066 in 2023) inclusive of the building, landing places, stairs, and railway tracks. All of the materials used had to be hauled up the 45-metre (148 ft) cliffs directly from supply boats. A further £3,526 (£514,447 in 2023) was spent on the shore station at Breasclete on the Isle of Lewis.[4] The lighthouse was first lit on 7 December 1899.

St. Flannan's Cell and Flannan Isles Lighthouse. Here is the source of one of the world's great mysteries for at the turn of the century three lightkeepers disappeared without trace.

The purpose of the railway tracks was to facilitate the transport of provisions for the keepers and fuel for the light (paraffin, at that date; the light consumed twenty barrels a year) up the steep gradients from the landing places by means of a cable-hauled railway. This was powered by a small steam engine in a shed adjoining the lighthouse. The rail line descended from the lighthouse in a westerly direction and then curved round to the south. In the approximate centre of the island it forked by means of a set of hand-operated points dubbed "Clapham Junction", in reference to a railway junction in London; one branch continued in its curvature to head eastwards to the east landing place, on the south-east corner of the island, thus forming a half-circle, while the other, slightly shorter, branch curved back to the west to serve the west landing, situated in a small inlet on the island's south coast. The final approaches to the landing stages were extremely steep. The cable was guided round the curves by pulleys set between the rails, and a line of posts set outside the inner rail prevented it from going too far astray should it jump off the pulleys. The cargo was carried in a small four-wheeled bogie.

In 1925, the lighthouse became one of the first Scottish lights to receive communications from the shore by wireless telegraphy. In the 1960s, the island's transport system was modernised. The railway was removed, leaving behind the concrete bed on which it had been laid to serve as a roadway for a "Gnat" – a three-wheeled, rubber-tyred cross-country vehicle powered by a 400-cubic-centimetre (24 cu in) four-stroke engine, built by Aimers McLean of Galashiels. This had a somewhat shorter working life than the railway, becoming redundant in its turn when the helipad was constructed. On 28 September 1971, the lighthouse was automated. A reinforced concrete helipad was constructed at the same time to enable maintenance visits in heavy weather. The light is produced by burning acetylene gas and has a range of 17 nautical miles (20 mi; 31 km). It is now monitored from the Butt of Lewis and the shore station has been converted into flats.

1900 CREW DISAPPEARANCE

The first record that something was abnormal on the Flannan Isles was on 15 December 1900 when the steamer Archtor, on a passage from Philadelphia to Leith, noted in its log that the light was not operational in poor weather conditions. When the ship docked in Leith on 18 December 1900, the sighting was passed on to the Northern Lighthouse Board. The relief vessel, the lighthouse tender Hesperus, was unable to sail from Breasclete, Lewis, as planned on 20 December due to adverse weather; it did not reach the island until noon on 26 December. The lighthouse was manned by three men: James Ducat, Thomas Marshall and Donald McArthur, with a rotating fourth man spending time on shore.

On arrival, the crew of the Hesperus and the relief keeper found that the flagpole had no flag, none of the usual provision boxes had been left on the landing stage for restocking and, more ominously, none of the lighthouse keepers were there to welcome them ashore. Jim Harvie, the captain of Hesperus, attempted to reach them by blowing the ship's whistle and firing a flare but was unsuccessful.

A boat was launched and Joseph Moore, the relief keeper, was put ashore alone. He found the entrance gate to the compound and the main door both closed, the beds unmade and the clock unwound. Returning to the landing stage with this grim news, he then went back up to the lighthouse with Hesperus's second mate and a seaman. A further search revealed that the lamps had been cleaned and refilled. A set of oilskins was found, suggesting that one of the keepers had left the lighthouse without them. There was no sign of any of the keepers, neither inside the lighthouse nor anywhere on the island.

Moore and three volunteer seamen were left on the island to attend the light and Hesperus returned to Lewis. Captain Harvie sent a telegram to the Northern Lighthouse Board dated 26 December 1900, stating:

A dreadful accident has happened at the Flannans. The three keepers, Ducat, Marshall and the Occasional have disappeared from the Island... The clocks were stopped and other signs indicated that the accident must have happened about a week ago. Poor fellows they must have been blown over the cliffs or drowned trying to secure a crane.

On Eilean Mòr the men scoured every corner of the island for clues as to the fate of the keepers. They found that everything was intact at the east landing but the west landing provided considerable evidence of damage caused by recent storms. A box at 33 metres (108 ft) above sea level had been broken and its contents strewn about; iron railings were bent over, the iron railway by the path was wrenched out of its concrete and a rock weighing more than a ton had been displaced. On top of the cliff, at more than 60 metres (200 ft) above sea level, turf had been ripped away as far as 10 metres (33 ft) from the cliff edge.

Northern Lighthouse Board investigation

On 29 December 1900 Robert Muirhead, a Northern Lighthouse Board (NLB) superintendent, arrived to conduct the official investigation into the incident. Muirhead had originally recruited all three of the missing men and knew them personally.

He examined the clothing left behind in the lighthouse and concluded that Ducat and Marshall had gone down to the western landing stage and that McArthur (the 'Occasional') had left the lighthouse during heavy rain in his shirt sleeves. He noted that whoever left the light last and unattended was in breach of NLB rules.[8] He also noted that some of the damage to the west landing was "difficult to believe unless actually seen“

From evidence which I was able to procure I was satisfied that the men had been on duty up till dinner time on Saturday the 15th of December, that they had gone down to secure a box in which the mooring ropes, landing ropes etc. were kept, and which was secured in a crevice in the rock about 110 feet [34 metres] above sea level, and that an extra large sea had rushed up the face of the rock, had gone above them, and coming down with immense force, had swept them completely away.

Whether this explanation brought any comfort to the families of the lost keepers (Ducat left a wife and four children; McArthur a wife and two children) is unknown. This development did, however, tarnish the lighthouse's reputation for many years after the incident.

Speculation and conjecture

No bodies were ever found, but there have been some mysterious sights resulting in "fascinated national speculation" in newspapers and periodicals of the era. Implausible stories ensued, such as that a sea serpent had carried the men away; that they had arranged for a ship to take them away and start new lives; that they had been abducted by foreign spies; or that they had met their fate through the malevolent presence of a boat filled with ghosts (the baleful influence of the "Phantom of the Seven Hunters" was widely suspected locally). More than ten years later the events were still being commemorated and elaborated on. The 1912 ballad "Flannan Isle" by Wilfrid Wilson Gibson refers erroneously to an overturned chair and uneaten meal laid out on the table, indicating that the keepers had been suddenly disturbed.

Yet, as we crowded through the door, we only saw a table spread.
For dinner, meat, and cheese and bread; But, all untouch'd; and no-one there,
As though, when they sat down to eat, Ere they could even taste,
Alarm had come, and they in haste Had risen and left the bread and meat,
For at the table head a chair Lay tumbled on the floor.

However, in a first-hand account made by Moore, the relief keeper, he stated that: "The kitchen utensils were all very clean, which is a sign that it must be after dinner some time they le

Later theories and interpretations

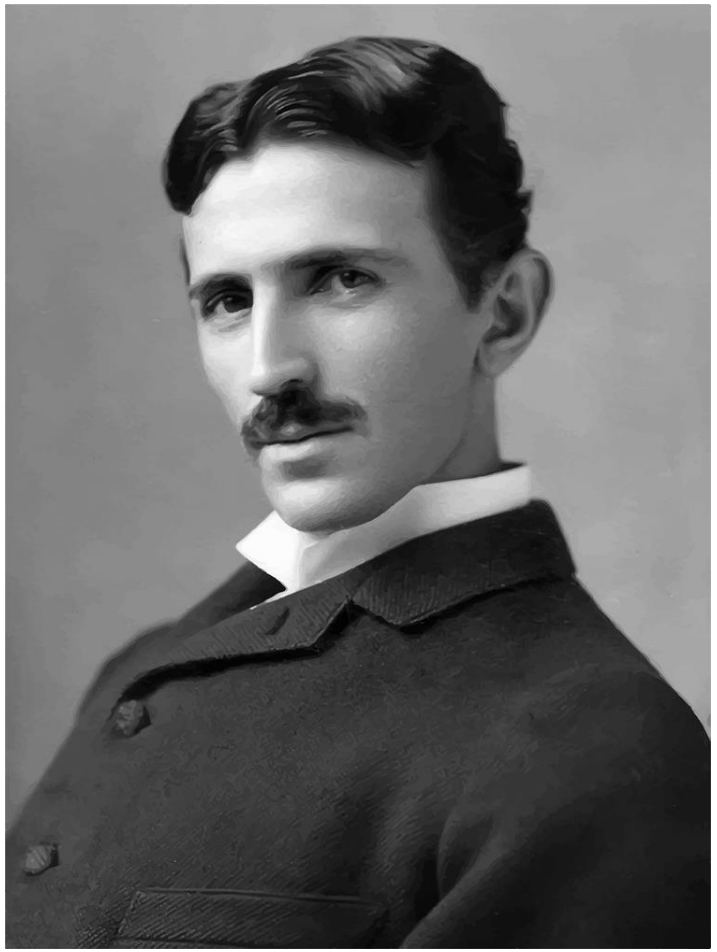
Over time a story has developed of the existence of unusual log book entries. They supposedly have Marshall saying on 12 December that there were "severe winds the likes of which I have never seen before in twenty years". He also is said to have reported that Ducat had been "very quiet" and Donald McArthur had been crying. McArthur was a veteran mariner with a reputation for brawling, and thus it would be strange for him to be crying in response to a storm. Log entries on 13 December were said to have stated that the storm was still raging and that all three men had been praying. This was also puzzling, as all three men were experienced lighthouse keepers who knew they were in a secure structure 150 feet above sea level and should have known they were safe inside. Furthermore, there had been no reported storms in the area on the 12, 13 and 14 December. The final log entry is said to have been made on 15 December, stating "Storm ended, sea calm. God is over all." However an investigation by Mike Dash for the Fortean Times revealed that the logbooks were fictional, later additions to the story.

Subsequent researchers have taken into account the geography of the islands.[8] The coastline of Eilean Mòr is deeply indented with narrow gullies called geos. The west landing, which is situated in such a geo, terminates in a cave. In high seas or storms water would rush into the cave and then explode out again with considerable force. It was possible McArthur saw a series of large waves approaching the island and, knowing the likely danger to his colleagues, ran down to warn them only to be washed away as well in the violent swell.

Recent research by James Love discovered that Marshall was previously fined five shillings when his equipment was washed away during a huge gale. It is likely, in seeking to avoid another fine, that he and Ducat tried to secure their equipment during a storm and were swept away as a result. The fate of McArthur, although he had been required to stay behind to man the lighthouse, can be guessed to be the same. Love speculates that McArthur probably tried to warn or help his colleagues and was swept away too. This theory also has the advantage of explaining the set of oilskins remaining indoors and McArthur's coat remaining on its peg, although perhaps not the closed door and gate. Another theory is based on the first-hand experiences of Walter Aldebert, a keeper on the Flannans from 1953 to 1957. He believed one man may have been washed into the sea but then his companions, who were trying to rescue him, were washed away by more rogue waves.

A further proposal is based on the psychology of the keepers. Allegedly, McArthur was a volatile character; this may have led to a fight breaking out near the cliff edge by the West Landing that caused all three men to fall to their deaths. Lost Crew:

Thomas Marshall 24 years old
James Ducat 48 years old
Donald McArthur ?



Nikola Tesla

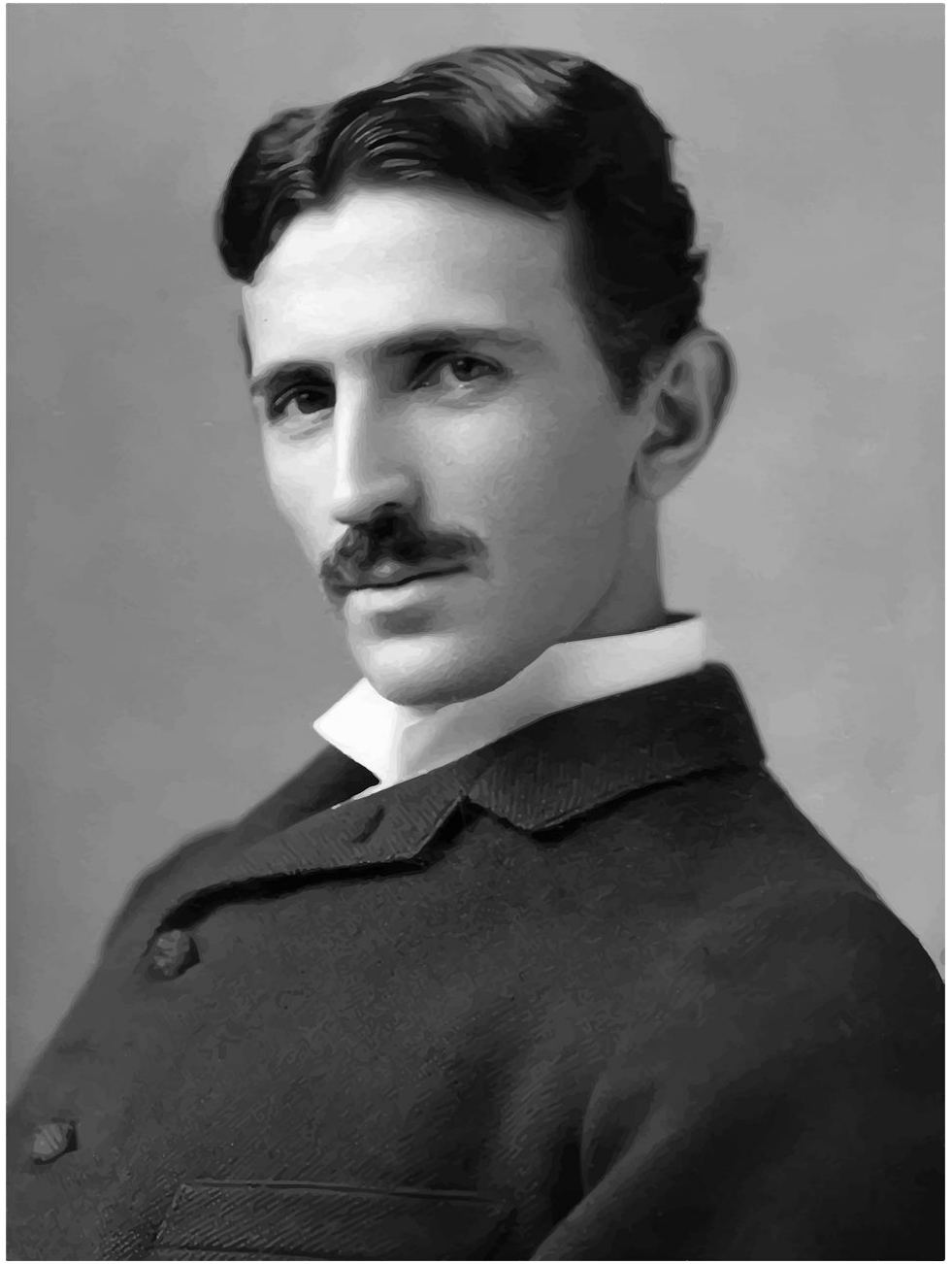
Born and raised in the Austrian Empire, Tesla first studied engineering and physics in the 1870s without receiving a degree.

Nikola Tesla 10 July 1856 – 7 January 1943) was a Serbian-American engineer, futurist, and inventor. He is known for his contributions to the design of the modern alternating current (AC) electricity supply system.

Born and raised in the Austrian Empire, Tesla first studied engineering and physics in the 1870s without receiving a degree. He then gained practical experience in the early 1880s working in telephony and at Continental Edison in the new electric power industry.

In 1884 he immigrated to the United States, where he became a naturalized citizen. He worked for a short time at the Edison Machine Works in New York City before he struck out on his own.

Tesla obtained around 300 patents worldwide for his inventions.



Tesla's father, Milutin, was an Orthodox priest in the village of Smiljan.

Nikola Tesla was born into an ethnic Serb family in the village of Smiljan, within the Military Frontier, in the Austrian Empire (present-day Croatia), on 10 July 1856. His father, Milutin Tesla (1819–1879), was a priest of the Eastern Orthodox Church. His father's brother Josif was a lecturer at a military academy who wrote several textbooks on mathematics.

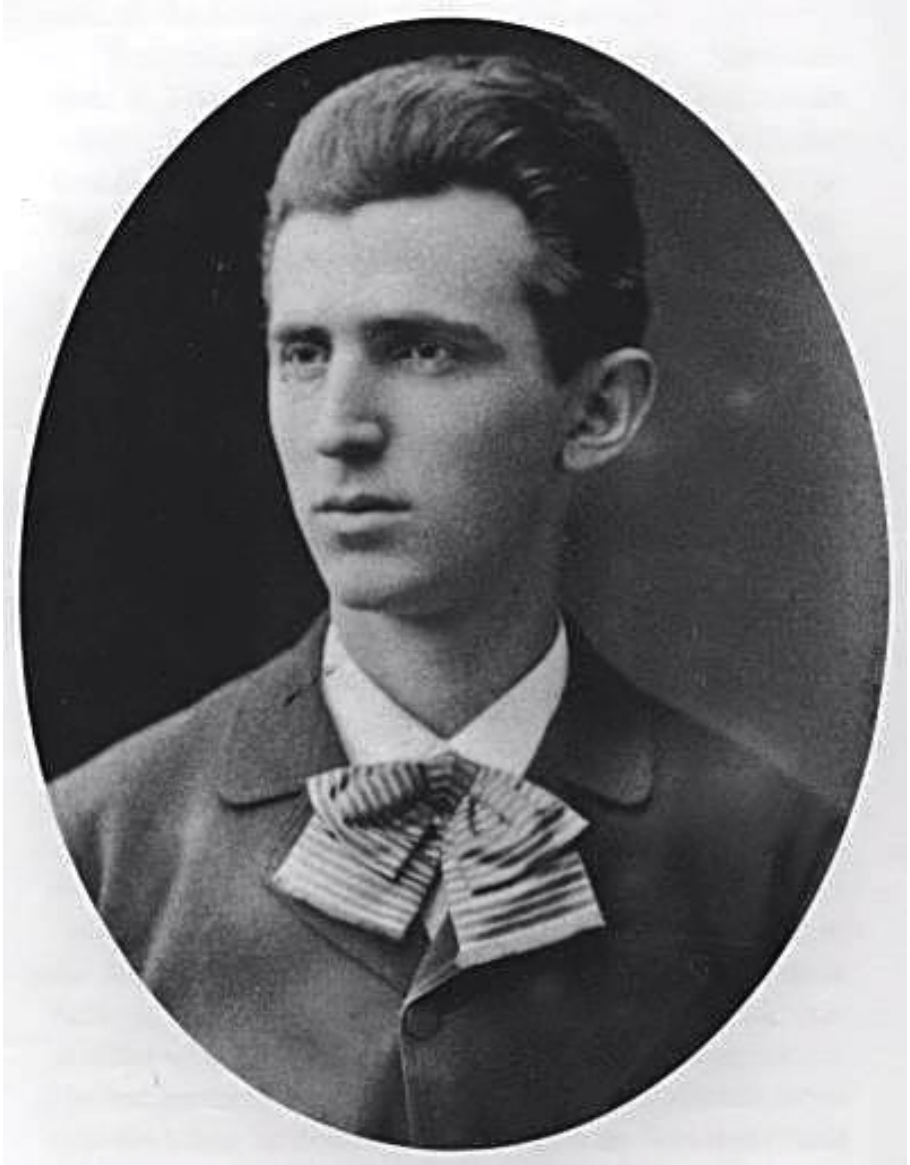
Tesla's mother, Georgina "Đuka" Mandić (1822–1892), whose father was also an Eastern Orthodox Church priest, had a talent for making home craft tools and mechanical appliances and the ability to memorize Serbian epic poems. Đuka had never received a formal education. Tesla credited his eidetic memory and creative abilities to his mother's genetics and influence. Tesla was the fourth of five children. He had three sisters, Milka, Angelina, and Marica, and an older brother named Dane, who was killed in a horse-riding accident when Tesla was aged six or seven.

In 1861, Tesla attended primary school in Smiljan where he studied German, arithmetic, and religion. In 1862, the Tesla family moved to the nearby town of Gospić, where Tesla's father worked as parish priest. Nikola completed primary school, followed by middle school. In 1870, Tesla moved to Karlovac to attend high school at the Higher Real Gymnasium where the classes were held in German, as it was usual throughout schools within the Austro-Hungarian Military Frontier. Later in his patent applications, before he obtained American citizenship, Tesla would identify himself as 'of Smiljan, Lika, border country of Austria-Hungary'.

Tesla later wrote that he became interested in demonstrations of electricity by his physics professor. Tesla noted that these demonstrations of this "mysterious phenomena" made him want "to know more of this wonderful force". Tesla was able to perform integral calculus in his head, which prompted his teachers to believe that he was cheating. He finished a four-year term in three years, graduating in 1873.

After graduating Tesla returned to Smiljan but soon contracted cholera, was bedridden for nine months and was near death multiple times. In a moment of despair, Tesla's father (who had originally wanted him to enter the priesthood), promised to send him to the best engineering school if he recovered from the illness. Tesla later said that he had read Mark Twain's earlier works while recovering from his illness. The next year Tesla evaded conscription into the Austro-Hungarian Army in Smiljan by running away southeast of Lika to Tomingaj, near Gračac. There he explored the mountains wearing hunter's garb. Tesla said that this contact with nature made him stronger, both physically and mentally. He enrolled at the Imperial-Royal Technical College in Graz in 1875 on a Military Frontier scholarship.

Tesla passed nine exams (nearly twice as many as required and received a letter of commendation from the dean of the technical faculty to his father, which stated, "Your son is a star of first rank. At Graz, Tesla noted his fascination with the detailed lectures on electricity presented by Professor Jakob Pöschl and described how he made suggestions on improving the design of an electric motor the professor was demonstrating. But by his third year he was failing in school and never graduated, leaving Graz in December 1878. One biographer suggests Tesla was not studying and may have been expelled for gambling and womanizing. Tesla's family did not hear from him after he left school. There was a rumor among his classmates that he had drowned in the nearby river Mur but in January one of them ran into Tesla in the town of Maribor and reported that encounter to Tesla's family. It turned out Tesla had been working there as a draftsman for 60 florins per month. In March 1879, Milutin finally located his son and tried to convince him to return home and take up his education in Prague.



Tesla returned to Gospić later that month when he was deported for not having a residence permit. Tesla's father died the next month, on 17 April 1879, at the age of 60 after an unspecified illness. During the rest of the year Tesla taught a large class of students in his old school in Gospić.
In January 1880, two of Tesla's uncles put together enough money to help him leave Gospić for Prague, where he was to study. He arrived too late to enroll at Charles-Ferdinand University; he had never studied Greek, a required subject; and he was illiterate in Czech, another required subject. Tesla did, however, attend lectures in philosophy at the university as an auditor but he did not receive grades for the courses.

Working at Budapest Telephone Exchange

Tesla moved to Budapest, Hungary, in 1881 to work under Tivadar Puskás at a telegraph company, the Budapest Telephone Exchange. Upon arrival, Tesla realized that the company, then under construction, was not functional, so he worked as a draftsman in the Central Telegraph Office instead. Within a few months, the Budapest Telephone Exchange became functional, and Tesla was allocated the chief electrician position. During his employment, Tesla made many improvements to the Central Station equipment and claimed to have perfected a telephone repeater or amplifier, which was never patented nor publicly described.

Working at Edison

In 1882, Tivadar Puskás got Tesla another job in Paris with the Continental Edison Company. Tesla began working in what was then a brand new industry, installing indoor incandescent lighting citywide in large scale electric power utility.

The company had several subdivisions and Tesla worked at the Société Electrique Edison, the division in the Ivry-sur-Seine suburb of Paris in charge of installing the lighting system. There he gained a great deal of practical experience in electrical engineering. Management took notice of his advanced knowledge in engineering and physics and soon had him designing and building improved versions of generating dynamos and motors. They also sent him on to troubleshoot engineering problems at other Edison utilities being built around France and in Germany.

Moving to the United States

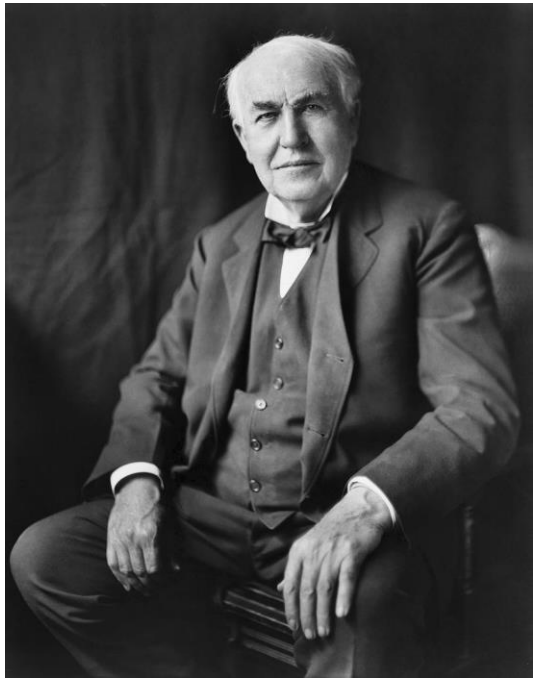
In 1884, Edison manager Charles Batchelor, who had been overseeing the Paris installation, was brought back to the United States to manage the Edison Machine Works, a manufacturing division situated in New York City, and asked that Tesla be brought to the United States as well. In June 1884, Tesla emigrated and began working almost immediately at the Machine Works on Manhattan's Lower East Side, an overcrowded shop with a workforce of several hundred machinists, laborers, managing staff, and 20 "field engineers" struggling with the task of building the large electric utility in that city.

Edison Machine Works on Goerck Street, New York. Tesla found the change from cosmopolitan Europe to working at this shop, located among the tenements on Manhattan's lower east side, a "painful surprise"

As in Paris, Tesla was working on troubleshooting installations and improving generators. Historian W. Bernard Carlson notes Tesla may have met company founder Thomas Edison only a couple of times. One of those times was noted in Tesla's autobiography where, after staying up all night repairing the damaged dynamos on the ocean liner SS Oregon, he ran into Batchelor and Edison, who made a quip about their "Parisian" being out all night. After Tesla told them he had been up all night fixing the Oregon, Edison commented to Batchelor that "this is a damned good man". One of the projects given to Tesla was to develop an arc lamp-based street lighting system. Arc lighting was the most popular type of street lighting but it required high voltages and was incompatible with the Edison low-voltage incandescent system, causing the company to lose contracts in some cities. Tesla's designs were never put into production, possibly because of technical improvements in incandescent street lighting or because of an installation deal that Edison made with an arc lighting company.

Tesla had been working at the Machine Works for a total of six months when he quit. What event precipitated his leaving is unclear. It may have been over a bonus he did not receive, either for redesigning generators or for the arc lighting system that was shelved. Tesla had previous run-ins with the Edison company over unpaid bonuses he believed he had earned.

Thomas Alva Edison (February 11, 1847 – October 18, 1931) was an American inventor and businessman. He developed many devices in fields such as electric power generation, mass communication, sound recording, and motion pictures. These inventions, which include the phonograph, the motion picture camera, and early versions of the electric light bulb,



In his autobiography, Tesla stated the manager of the Edison Machine Works offered a $50,000 bonus to design "twenty-four different types of standard machines" "but it turned out to be a practical joke". Later versions of this story have Thomas Edison himself offering and then reneging on the deal, quipping "Tesla, you don't understand our American humor". The size of the bonus in either story has been noted as odd since Machine Works manager Batchelor was stingy with pay and the company did not have that amount of cash (equal to $1,695,556 today) on hand. Tesla's diary contains just one comment on what happened at the end of his employment, a note he scrawled across the two pages covering 7 December 1884, to 4 January 1885, saying "Good By to the Edison Machine Works".

Tesla Electric Light and Manufacturing

Soon after leaving the Edison company, Tesla was working on patenting an arc lighting system, possibly the same one he had developed at Edison. In March 1885, he met with patent attorney Lemuel W. Serrell, the same attorney used by Edison, to obtain help with submitting the patents. Serrell introduced Tesla to two businessmen, Robert Lane and Benjamin Vail, who agreed to finance an arc lighting manufacturing and utility company in Tesla's name, the Tesla Electric Light and Manufacturing Company. Tesla worked for the rest of the year obtaining the patents that included an improved DC generator, the first patents issued to Tesla in the US, and building and installing the system in Rahway, New Jersey. Tesla's new system gained notice in the technical press, which commented on its advanced features.

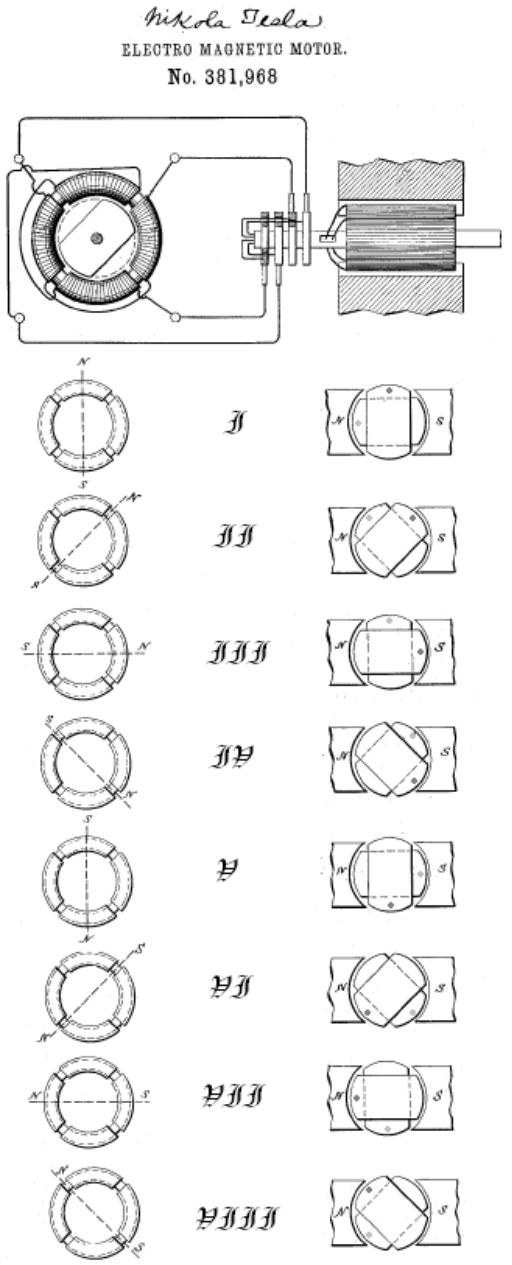
The investors showed little interest in Tesla's ideas for new types of alternating current motors and electrical transmission equipment. After the utility was up and running in 1886, they decided that the manufacturing side of the business was too competitive and opted to simply run an electric utility. They formed a new utility company, abandoning Tesla's company and leaving the inventor penniless. Tesla even lost control of the patents he had generated, since he had assigned them to the company in exchange for stock. He had to work at various electrical repair jobs and as a ditch digger for $2 per day. Later in life Tesla recounted that part of 1886 as a time of hardship, writing "My high education in various branches of science, mechanics and literature seemed to me like a mockery“.

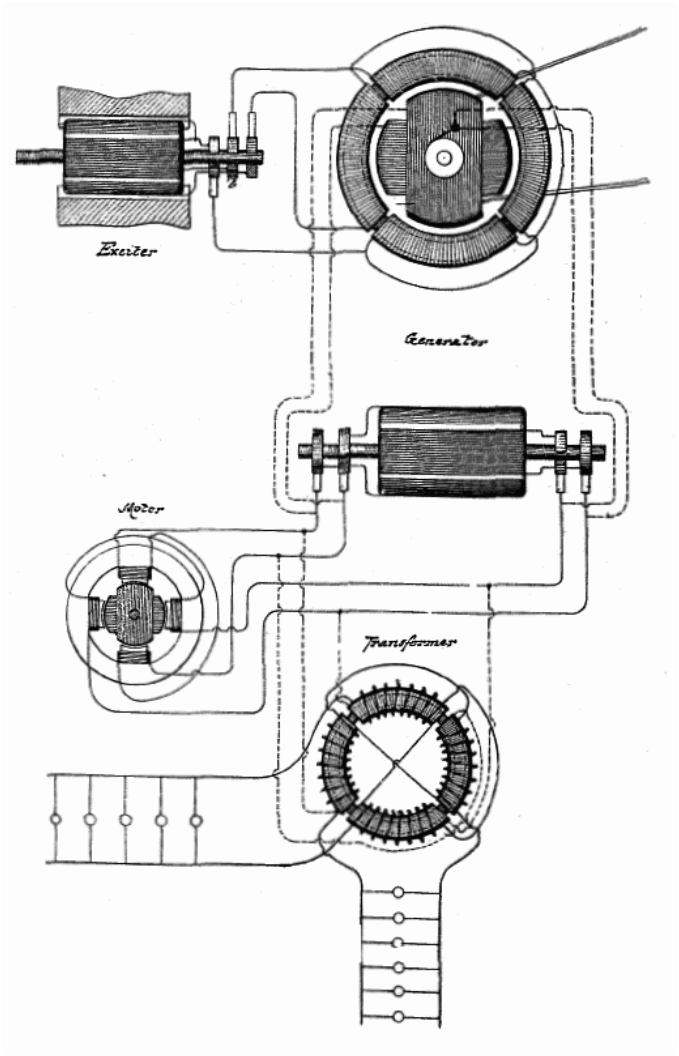
AC and the induction motor

In late 1886, Tesla met Alfred S. Brown, a Western Union superintendent, and New York attorney Charles Fletcher Peck. The two men were experienced in setting up companies and promoting inventions and patents for financial gain. Based on Tesla's new ideas for electrical equipment, including a thermo-magnetic motor idea,[66] they agreed to back the inventor financially and handle his patents. Together they formed the Tesla Electric Company in April 1887, with an agreement that profits from generated patents would go 1⁄3 to Tesla, 1⁄3 to Peck and Brown, and 1⁄3 to fund development. They set up a laboratory for Tesla at 89 Liberty Street in Manhattan, where he worked on improving and developing new types of electric motors, generators, and other devices.

In 1887, Tesla developed an induction motor that ran on alternating current (AC), a power system format that was rapidly expanding in Europe and the United States because of its advantages in long-distance, high-voltage transmission. The motor used polyphase current, which generated a rotating magnetic field to turn the motor (a principle that Tesla claimed to have conceived in 1882). This innovative electric motor, patented in May 1888, was a simple self-starting design that did not need a commutator, thus avoiding sparking and the high maintenance of constantly servicing and replacing mechanical brushes.

Along with getting the motor patented, Peck and Brown arranged to get the motor publicized, starting with independent testing to verify it was a functional improvement, followed by press releases sent to technical publications for articles to run concurrently with the issue of the patent. Physicist William Arnold Anthony (who tested the motor) and Electrical World magazine editor Thomas Commerford Martin arranged for Tesla to demonstrate his AC motor on 16 May 1888 at the American Institute of Electrical Engineers. Engineers working for the Westinghouse Electric & Manufacturing Company reported to George Westinghouse that Tesla had a viable AC motor and related power system—something Westinghouse needed for the alternating current system he was already marketing.





Tesla's AC dynamo-electric machine (AC electric generator) in an 1888 U.S. patent 390,721

Photograph of George Westinghouse Jr. (October 6, 1846 – March 12, 1914) in 1884 - American entrepreneur and engineer based in Pennsylvania

Westinghouse looked into getting a patent on a similar commutator-less, rotating magnetic field-based induction motor developed in 1885 and presented in a paper in March 1888 by Italian physicist Galileo Ferraris, but decided that Tesla's patent would probably control the market. In July 1888, Brown and Peck negotiated a licensing deal with George Westinghouse for Tesla's polyphase induction motor and transformer designs for $60,000 in cash and stock and a royalty of $2.50 per AC horsepower produced by each motor.
Westinghouse also hired Tesla for one year for the large fee of $2,000 ($67,800 in today's dollars) per month to be a consultant at the Westinghouse Electric & Manufacturing Company's Pittsburgh labs.
During that year, Tesla worked in Pittsburgh, helping to create an alternating current system to power the city's streetcars. He found it a frustrating period because of conflicts with the other Westinghouse engineers over how best to implement AC power.

Market turmoil

Tesla's demonstration of his induction motor and Westinghouse's subsequent licensing of the patent, both in 1888, came at the time of extreme competition between electric companies. The three big firms, Westinghouse, Edison, and Thomson-Houston Electric Company, were trying to grow in a capital-intensive business while financially undercutting each other. There was even a "war of currents" propaganda campaign going on, with Edison Electric claiming their direct current system was better and safer than the Westinghouse alternating current system and Thomson-Houston sometimes siding with Edison. Competing in this market meant Westinghouse would not have the cash or engineering resources to develop Tesla's motor and the related polyphase system right away.

Two years after signing the Tesla contract, Westinghouse Electric was in trouble. The near collapse of Barings Bank in London triggered the financial panic of 1890, causing investors to call in their loans to Westinghouse Electric. The sudden cash shortage forced the company to refinance its debts. The new lenders demanded that Westinghouse cut back on what looked like excessive spending on acquisition of other companies, research, and patents, including the per motor royalty in the Tesla contract. At that point, the Tesla induction motor had been unsuccessful and was stuck in development. Westinghouse was paying a $15,000-a-year guaranteed royalty even though operating examples of the motor were rare and polyphase power systems needed to run it were even rarer. In early 1891, George Westinghouse explained his financial difficulties to Tesla in stark terms, saying that, if he did not meet the demands of his lenders, he would no longer be in control of Westinghouse Electric and Tesla would have to "deal with the bankers" to try to collect future royalties.

The advantages of having Westinghouse continue to champion the motor probably seemed obvious to Tesla and he agreed to release the company from the royalty payment clause in the contract. Six years later Westinghouse purchased Tesla's patent for a lump sum payment of $216,000 as part of a patent-sharing agreement signed with General Electric (a company created from the 1892 merger of Edison and Thomson-Houston)

New York laboratories

The money Tesla made from licensing his AC patents made him independently wealthy and gave him the time and funds to pursue his own interests. In 1889, Tesla moved out of the Liberty Street shop Peck and Brown had rented and for the next dozen years worked out of a series of workshop/laboratory spaces in Manhattan. These included a lab at 175 Grand Street (1889–1892), the fourth floor of 33–35 South Fifth Avenue (1892–1895), and sixth and seventh floors of 46 & 48 East Houston Street (1895–1902). Tesla and his hired staff conducted some of his most significant work in these workshops.

General Electric Company (GE) was an American multinational conglomerate founded in 1892, incorporated in the state of New York and headquartered in Boston. The company had several divisions, including aerospace, energy, healthcare, and finance.

In the summer of 1889, Tesla traveled to the 1889 Exposition Universelle in Paris and learned of Heinrich Hertz's 1886–1888 experiments that proved the existence of electromagnetic radiation, including radio waves. In repeating and then expanding on these experiments Tesla tried powering a Ruhmkorff coil with a high speed alternator he had been developing as part of an improved arc lighting system but found that the high-frequency current overheated the iron core and melted the insulation between the primary and secondary windings in the coil. To fix this problem Tesla came up with his "oscillating transformer", with an air gap instead of insulating material between the primary and secondary windings and an iron core that could be moved to different positions in or out of the coil.

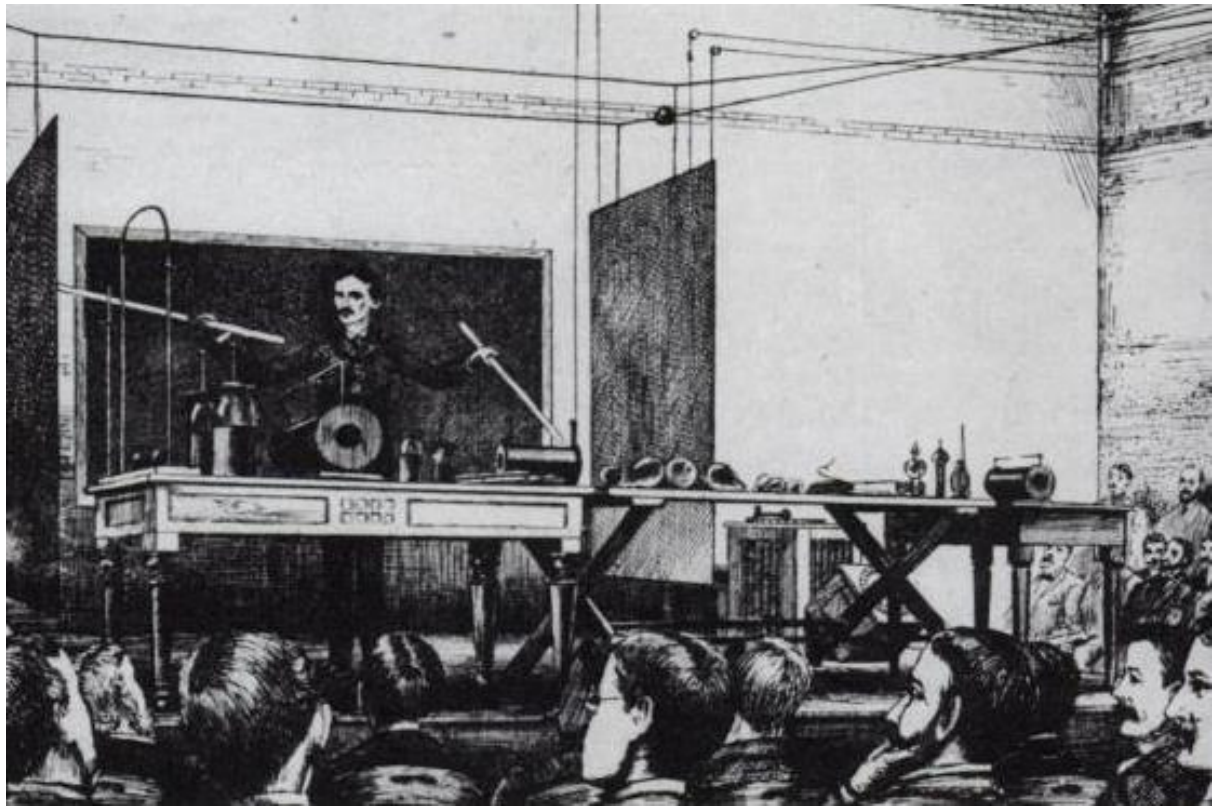
Later called the Tesla coil, it would be used to produce high-voltage, low-current, high frequency alternating-current electricity. He would use this resonant transformer circuit in his later wireless power work. On 30 July 1891, aged 35, Tesla became a naturalized citizen of the United States. In the same year, he patented his Tesla coil.

A Tesla coil is an electrical resonant transformer circuit designed by inventor Nikola Tesla in 1891. It is used to produce high-voltage, low-current, high-frequency alternating-current electricity. Tesla experimented with a number of different configurations consisting of two, or sometimes three, coupled resonant electric circuits.

Wireless lighting

After 1890, Tesla experimented with transmitting power by inductive and capacitive coupling using high AC voltages generated with his Tesla coil. He attempted to develop a wireless lighting system based on near-field inductive and capacitive coupling and conducted a series of public demonstrations where he lit Geissler tubes and even incandescent light bulbs from across a stage. He spent most of the decade working on variations of this new form of lighting with the help of various investors but none of the ventures succeeded in making a commercial product out of his findings.

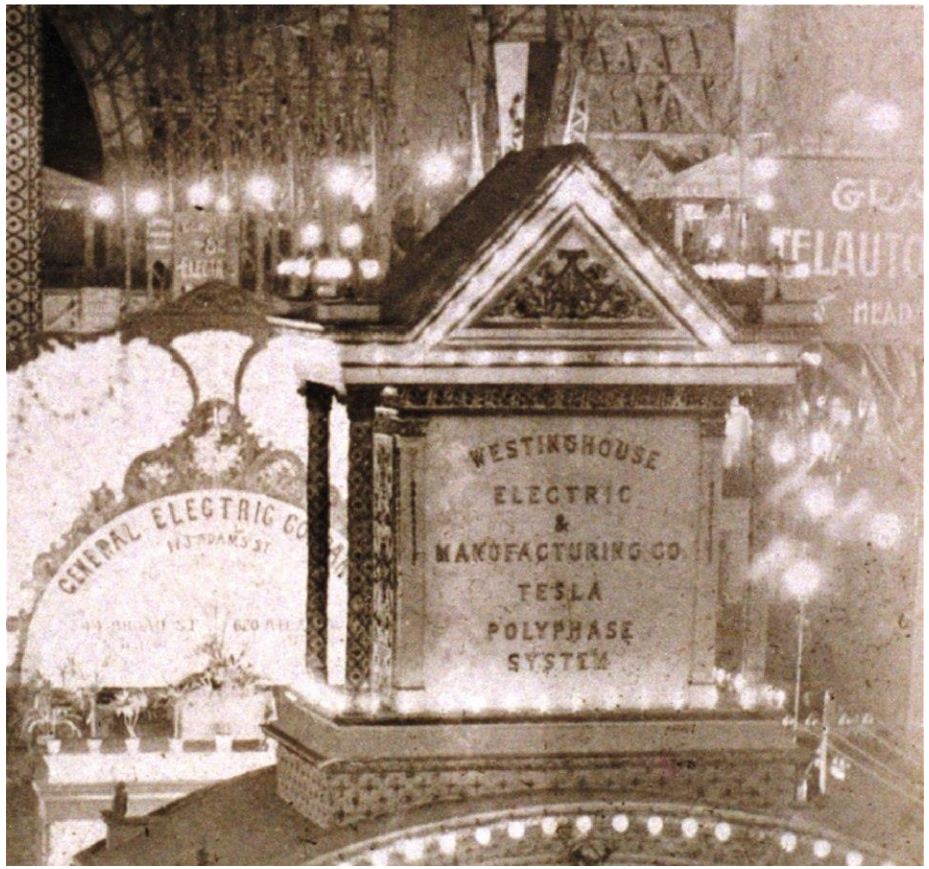
In 1893 at St. Louis, Missouri, the Franklin Institute in Philadelphia, Pennsylvania and the National Electric Light Association, Tesla told onlookers that he was sure a system like his could eventually conduct "intelligible signals or perhaps even power to any distance without the use of wires" by conducting it through the Earth.



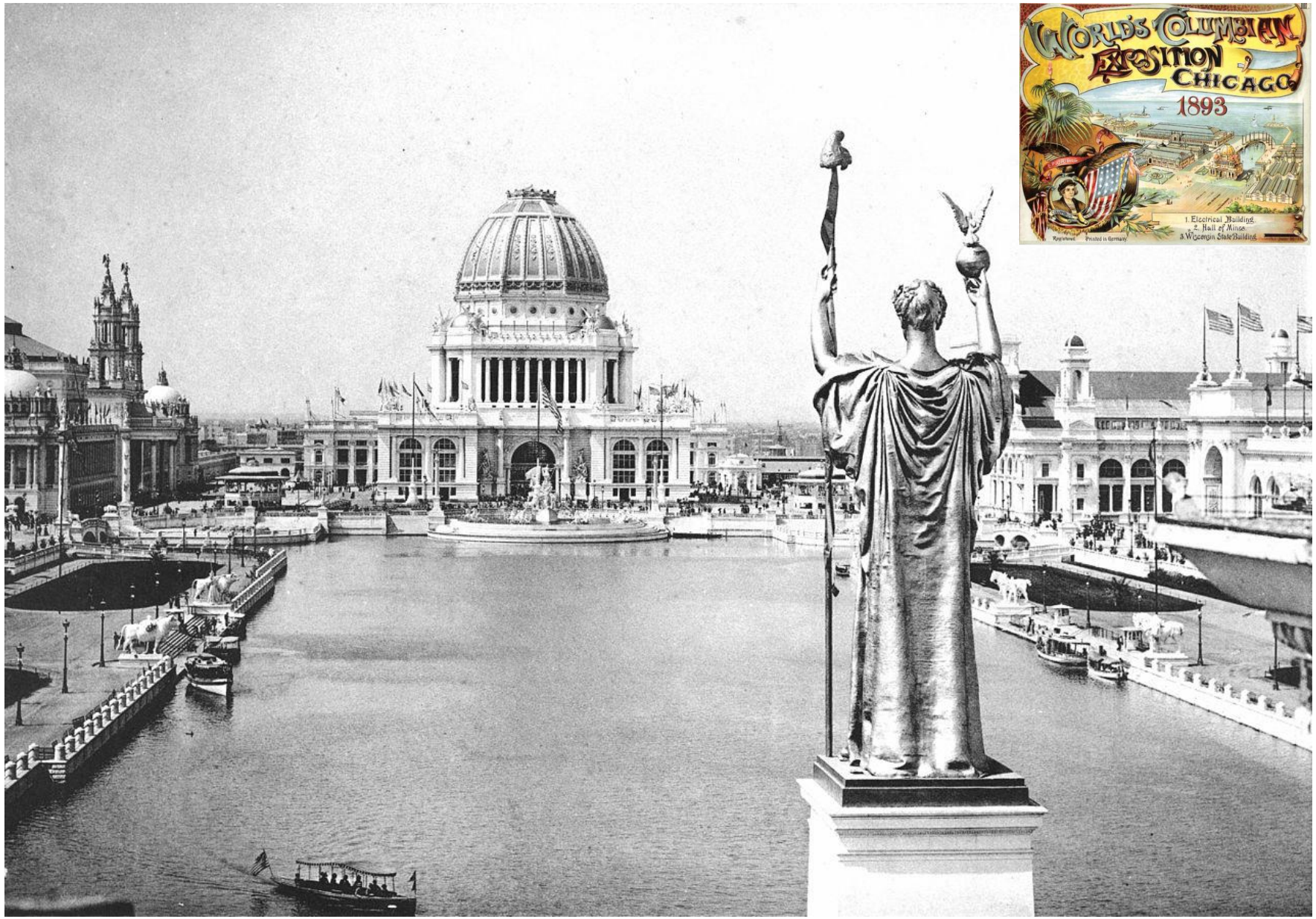
Tesla demonstrating wireless lighting by "electrostatic induction" during an 1891 lecture at Columbia College via two long Geissler tubes (similar to neon tubes) in his hands

Polyphase system and the Columbian Exposition

By the beginning of 1893, Westinghouse engineer Charles F. Scott and then Benjamin G. Lamme had made progress on an efficient version of Tesla's induction motor. Lamme found a way to make the polyphase system it would need compatible with older single-phase AC and DC systems by developing a rotary converter. Westinghouse Electric now had a way to provide electricity to all potential customers and started branding their polyphase AC system as the "Tesla Polyphase System". They believed that Tesla's patents gave them patent priority over other polyphase AC systems. Westinghouse Electric asked Tesla to participate in the 1893 World's Columbian Exposition in Chicago where the company had a large space in the "Electricity Building" devoted to electrical exhibits. Westinghouse Electric won the bid to light the Exposition with alternating current and it was a key event in the history of AC power, as the company demonstrated to the American public the safety, reliability, and efficiency of an alternating current system that was polyphase and could also supply the other AC and DC exhibits at the fair.



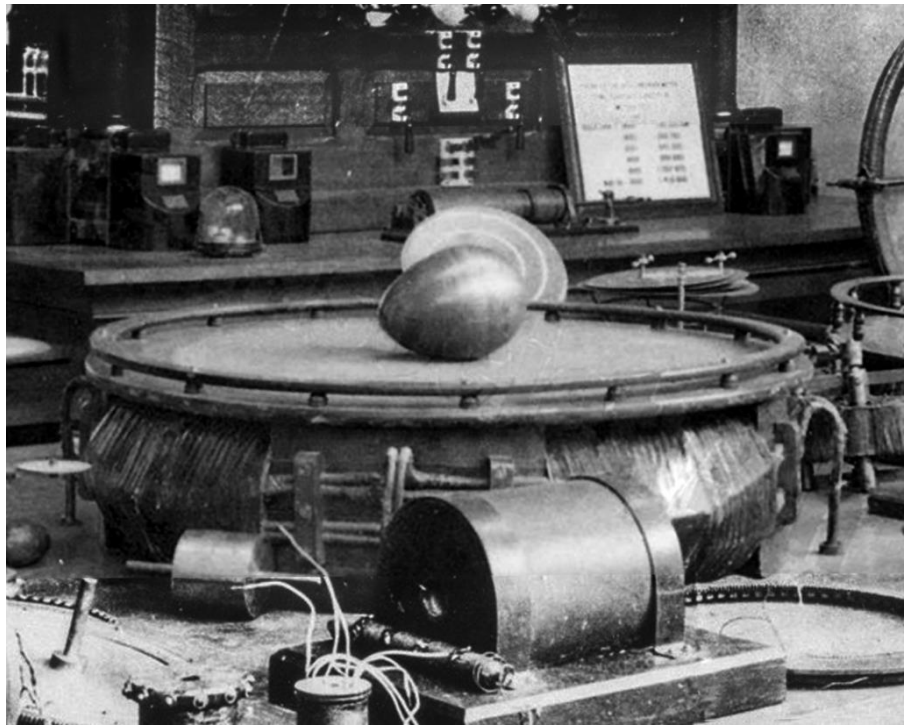
A Westinghouse display of the "Tesla Polyphase System" at Chicago's 1893 Columbian Exposition



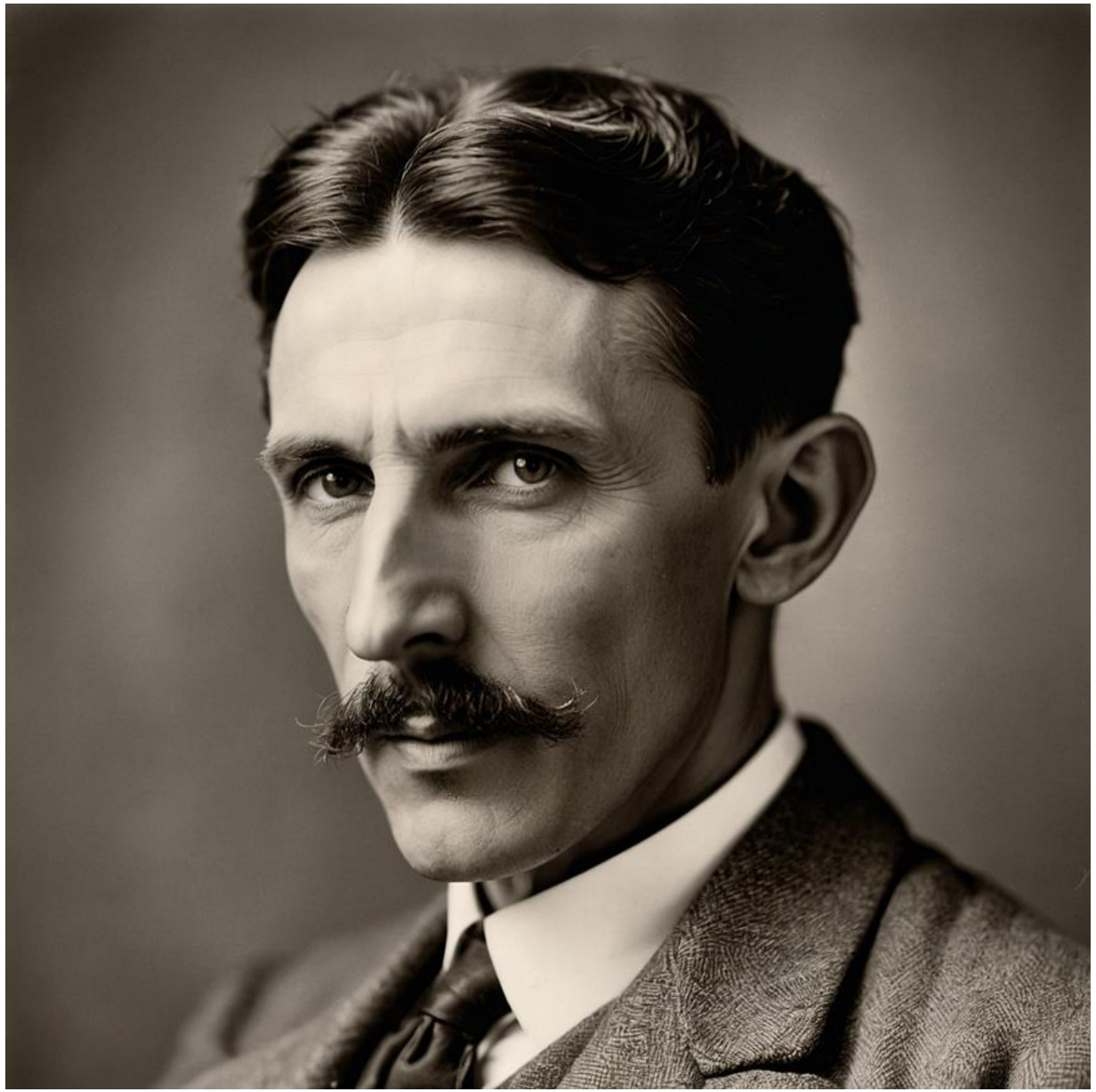
The World's Columbian Exposition, also known as the Chicago World's Fair, was a world's fair held in Chicago from May 5 to October 31, 1893, to celebrate the 400th anniversary of Christopher Columbus's arrival in the New World in 1492. The centerpiece of the Fair, held in Jackson Park, was a large water pool representing the voyage that Columbus took to the New World. Chicago won the right to host the fair over several competing cities, including New York City, Washington, D.C., and St. Louis.

A special exhibit space was set up to display various forms and models of Tesla's induction motor. The rotating magnetic field that drove them was explained through a series of demonstrations including an Egg of Columbus that used the two-phase coil found in an induction motor to spin a copper egg making it stand on end.

Tesla visited the fair for a week during its six-month run to attend the International Electrical Congress and put on a series of demonstrations at the Westinghouse exhibit. A specially darkened room had been set up where Tesla showed his wireless lighting system, using a demonstration he had previously performed throughout America and Europe; these included using high-voltage, high-frequency alternating current to light wireless gas-discharge lamps.



Tesla's Egg of Columbus was a device exhibited in the Westinghouse Electric display at the 1893 Chicago World's Columbian Exposition to explain the rotating magnetic field that drove the new alternating current induction motors designed by inventor Nikola Tesla by using that magnetic field to spin a copper egg on end.



Gas-discharge lamps are a family of artificial light sources that generate light by sending an electric discharge through an ionized gas, a plasma.

Typically, such lamps use a noble gas (argon, neon, krypton, and xenon) or a mixture of these gases.

TESLA'S OSCILLATOR AS SHOWN AT THE COLUMBIAN EXPOSITION.

Tesla's electro-mechanical oscillator is a steam-powered electric generator patented by Nikola Tesla in 1893. Later in life, Tesla claimed one version of the oscillator caused an earthquake in New York City in 1898, gaining it the colloquial title "Tesla's earthquake machine".

Steam-powered oscillating generator

During his presentation at the International Electrical Congress in the Columbian Exposition Agriculture Hall, Tesla introduced his steam powered reciprocating electricity generator that he patented that year, something he thought was a better way to generate alternating current. Steam was forced into the oscillator and rushed out through a series of ports, pushing a piston up and down that was attached to an armature.

The magnetic armature vibrated up and down at high speed, producing an alternating magnetic field. This induced alternating electric current in the wire coils located adjacent. It did away with the complicated parts of a steam engine/generator, but never caught on as a feasible engineering solution to generate electricity.

Consulting on Niagara

In 1893, Edward Dean Adams, who headed the Niagara Falls Cataract Construction Company, sought Tesla's opinion on what system would be best to transmit power generated at the falls. Over several years, there had been a series of proposals and open competitions on how best to do it. Among the systems proposed by several US and European companies were two-phase and three-phase AC, high-voltage DC, and compressed air. Adams asked Tesla for information about the current state of all the competing systems. Tesla advised Adams that a two-phased system would be the most reliable and that there was a Westinghouse system to light incandescent bulbs using two-phase alternating current. The company awarded a contract to Westinghouse Electric for building a two-phase AC generating system at the Niagara Falls, based on Tesla's advice and Westinghouse's demonstration at the Columbian Exposition. At the same time, a further contract was awarded to General Electric to build the AC distribution system.

Schoellkopf Stations 3, 3-B and 3-C

In 1860, Horace H. Day purchased the company and renamed it the "Niagara Falls Canal Company." At an investment of $1.5 million, (equivalent to $42,919,000 in 2023) the canal was finally completed in 1861,

The Nikola Tesla Company

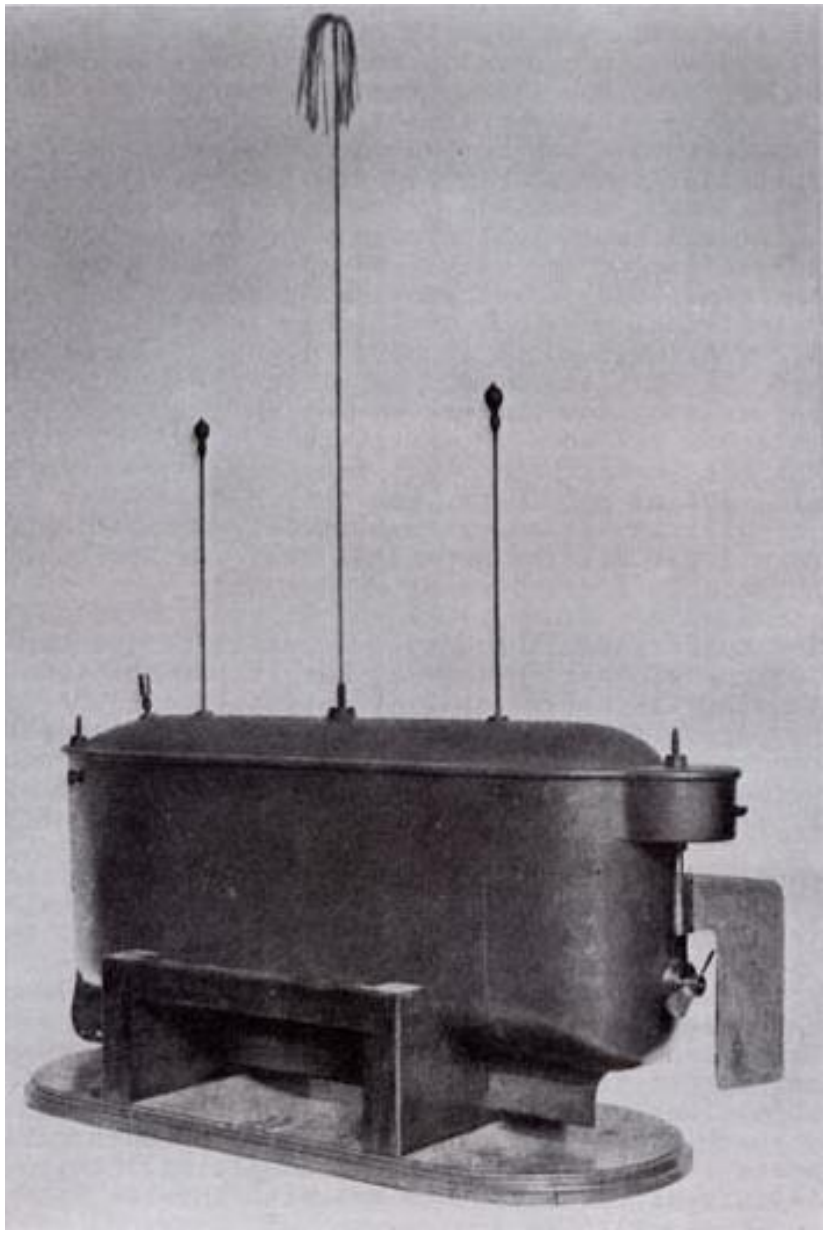
In 1895, Edward Dean Adams, impressed with what he saw when he toured Tesla's lab, agreed to help found the Nikola Tesla Company, set up to fund, develop, and market a variety of previous Tesla patents and inventions as well as new ones. Alfred Brown signed on, bringing along patents developed under Peck and Brown. The board was filled out with William Birch Rankine and Charles F. Coaney. It found few investors since the mid-1890s were a tough time financially, and the wireless lighting and oscillators patents it was set up to market never panned out. The company handled Tesla's patents for decades to come.

Lab fire

In the early morning hours of 13 March 1895, the South Fifth Avenue building that housed Tesla's lab caught fire. It started in the basement of the building and was so intense Tesla's 4th-floor lab burned and collapsed into the second floor. The fire not only set back Tesla's ongoing projects, but it also destroyed a collection of early notes and research material, models, and demonstration pieces, including many that had been exhibited at the 1893 Worlds Colombian Exposition. Tesla told The New York Times "I am in too much grief to talk. What can I say?". After the fire Tesla moved to 46 & 48 East Houston Street and rebuilt his lab on the 6th and 7th floors.

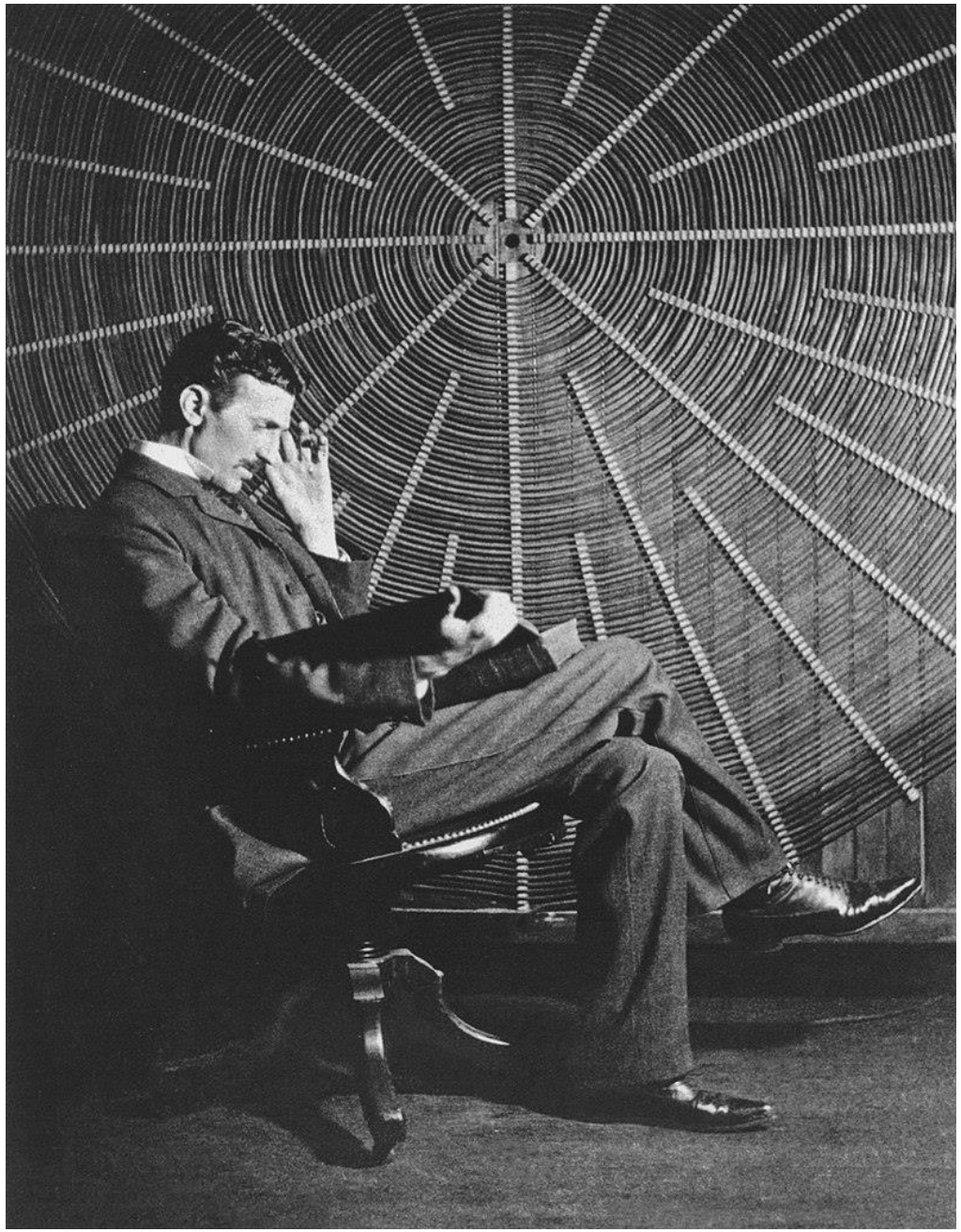
X-ray experimentation

Starting in 1894, Tesla began investigating what he referred to as radiant energy of "invisible" kinds after he had noticed damaged film in his laboratory in previous experiments (later identified as "Roentgen rays" or "X-rays"). His early experiments were with Crookes tubes, a cold cathode electrical discharge tube. Tesla may have inadvertently captured an X-ray image—predating, by a few weeks, Wilhelm Röntgen's December 1895 announcement of the discovery of X-rays—when he tried to photograph Mark Twain illuminated by a Geissler tube, an earlier type of gas discharge tube. The only thing captured in the image was the metal locking screw on the camera lens.



In 1898, Tesla demonstrated a radio-controlled boat, which he hoped to sell as a guided torpedo to navies around the world.

In 1898, Tesla demonstrated a boat that used a coherer-based radio control—which he dubbed "telautomaton"—to the public during an electrical exhibition at Madison Square Garden. Tesla tried to sell his idea to the US military as a type of radio-controlled torpedo, but they showed little interest. Remote radio control remained a novelty until World War I and afterward, when a number of countries used it in military programs. Tesla took the opportunity to further demonstrate "Teleautomatics" in an address to a meeting of the Commercial Club in Chicago, while he was traveling to Colorado Springs, on 13 May 1899.

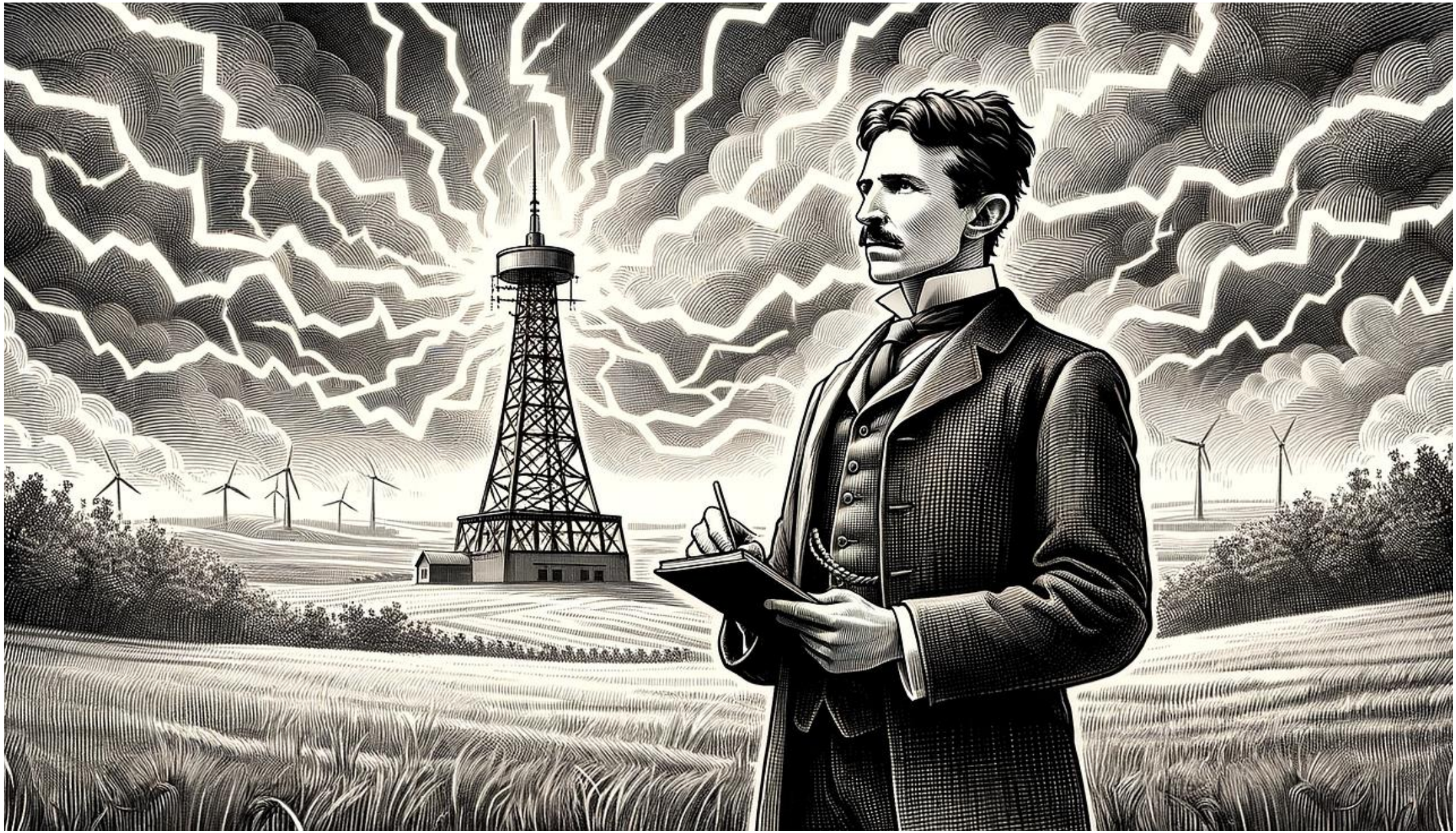


Wireless power

Tesla went on to develop a wireless power distribution system that he hoped would be capable of transmitting power long distance directly into homes and factories. Early on he seemed to borrow from the ideas of Mahlon Loomis, proposing a system composed of balloons to suspend transmitting and receiving electrodes in the air above 30,000 feet (9,100 m) in altitude, where he thought the pressure would allow him to send high voltages (millions of volts) long distances. To further study the conductive nature of low pressure air he set up a test facility at high altitude in Colorado Springs during 1899. Experiments he conducted there with a large coil operating in the megavolts range, as well as observations he made of the electronic noise of lightning strikes, led him to conclude incorrectly that he could use the entire globe of the Earth to conduct electrical energy. The theory included driving alternating current pulses into the Earth at its resonant frequency from a grounded Tesla coil working against an elevated capacitance to make the potential of the Earth oscillate. Tesla thought this would allow alternating current to be received with a similar capacitive antenna tuned to resonance with it at any point on Earth with very little power loss.

Experiment in resonant inductive transfer by Tesla at Colorado Springs 1899. The coil is in resonance with Tesla's magnifying transmitter nearby, powering the light bulb at bottom. (right) Tesla's unsuccessful Wardenclyffe power station.

After 1890, inventor Nikola Tesla experimented with transmitting power by inductive and capacitive coupling using spark-excited radio frequency resonant transformers, now called Tesla coils, which generated high AC voltages. Early on he attempted to develop a wireless lighting system based on near-field inductive and capacitive coupling and conducted a series of public demonstrations where he lit Geissler tubes and even incandescent light bulbs from across a stage. He found he could increase the distance at which he could light a lamp by using a receiving LC circuit tuned to resonance with the transmitter's LC circuit. using resonant inductive coupling. Tesla failed to make a commercial product out of his findings but his resonant inductive coupling method is now widely used in electronics and is currently being applied to short-range wireless power systems.

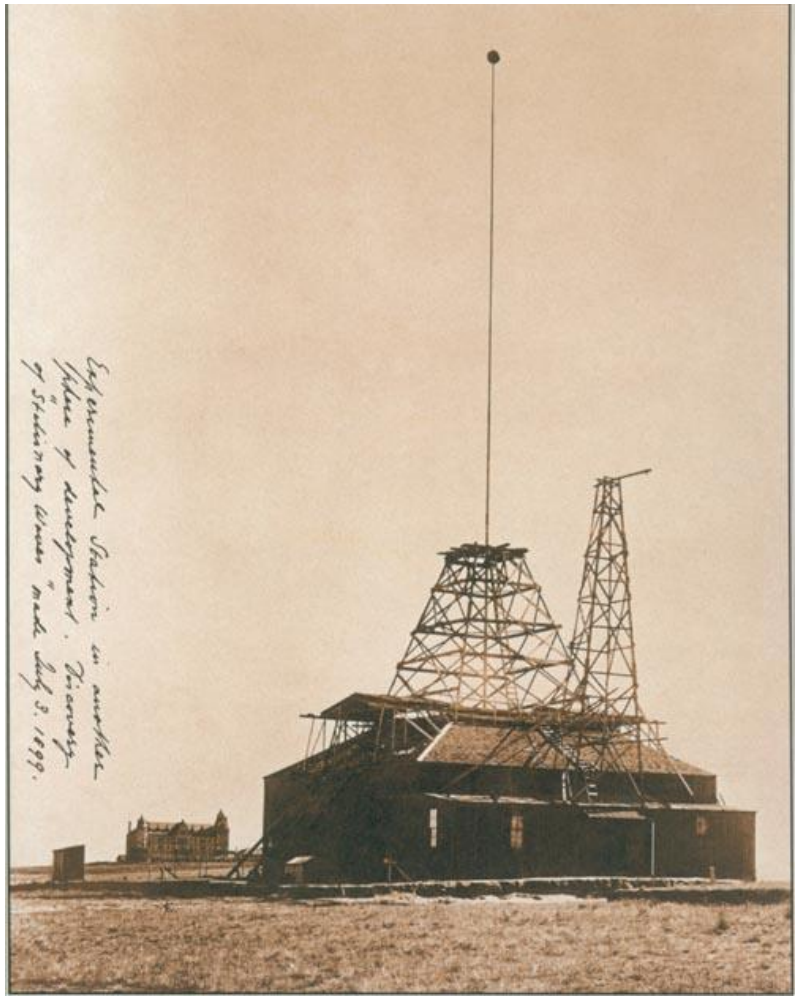


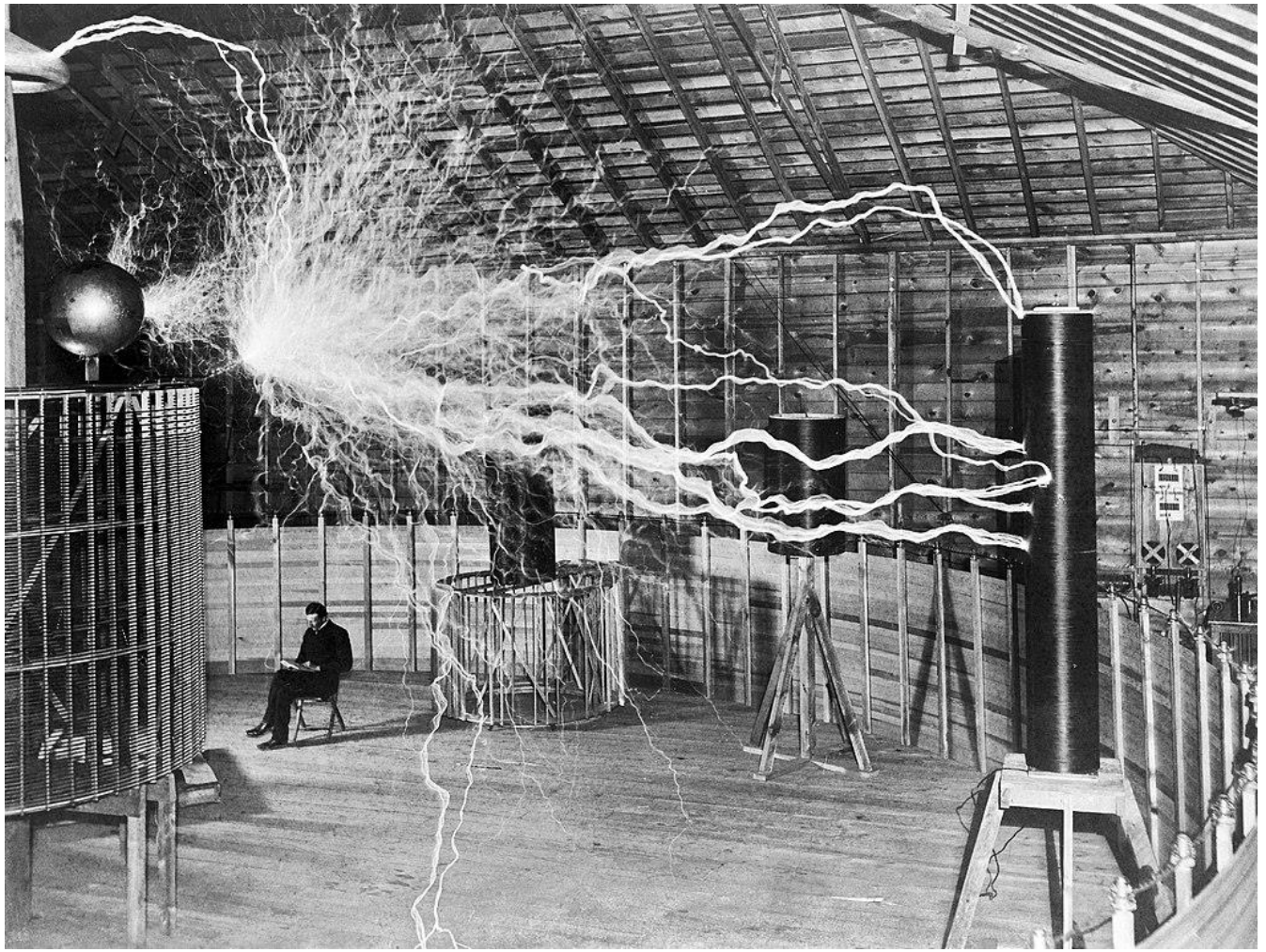
His observations also led him to believe a high voltage used in a coil at an elevation of a few hundred feet would "break the air stratum down", eliminating the need for miles of cable hanging on balloons to create his atmospheric return circuit. Tesla would go on the next year to propose a "World Wireless System" that was to broadcast both information and power worldwide. In 1901, at Shoreham, New York he attempted to construct a large high-voltage wireless power station, now called Wardenclyffe Tower, but by 1904 investment dried up and the facility was never completed.

Post-war developments

Before World War II, little progress was made in wireless power transmission. Radio was developed for communication uses, but could not be used for power transmission since the relatively low-frequency radio waves spread out in all directions and little energy reached the receiver. In radio communication, at the receiver, an amplifier intensifies a weak signal using energy from another source. For power transmission, efficient transmission required transmitters that could generate higher-frequency microwaves, which can be focused in narrow beams towards a receiver.

The development of microwave technology during World War II, such as the klystron and magnetron tubes and parabolic antennas, made radiative (far-field) methods practical for the first time, and the first long-distance wireless power transmission was achieved in the 1960s by William C. Brown. In 1964, Brown invented the rectenna which could efficiently convert microwaves to DC power, and in 1964 demonstrated it with the first wireless-powered aircraft, a model helicopter powered by microwaves beamed from the ground.



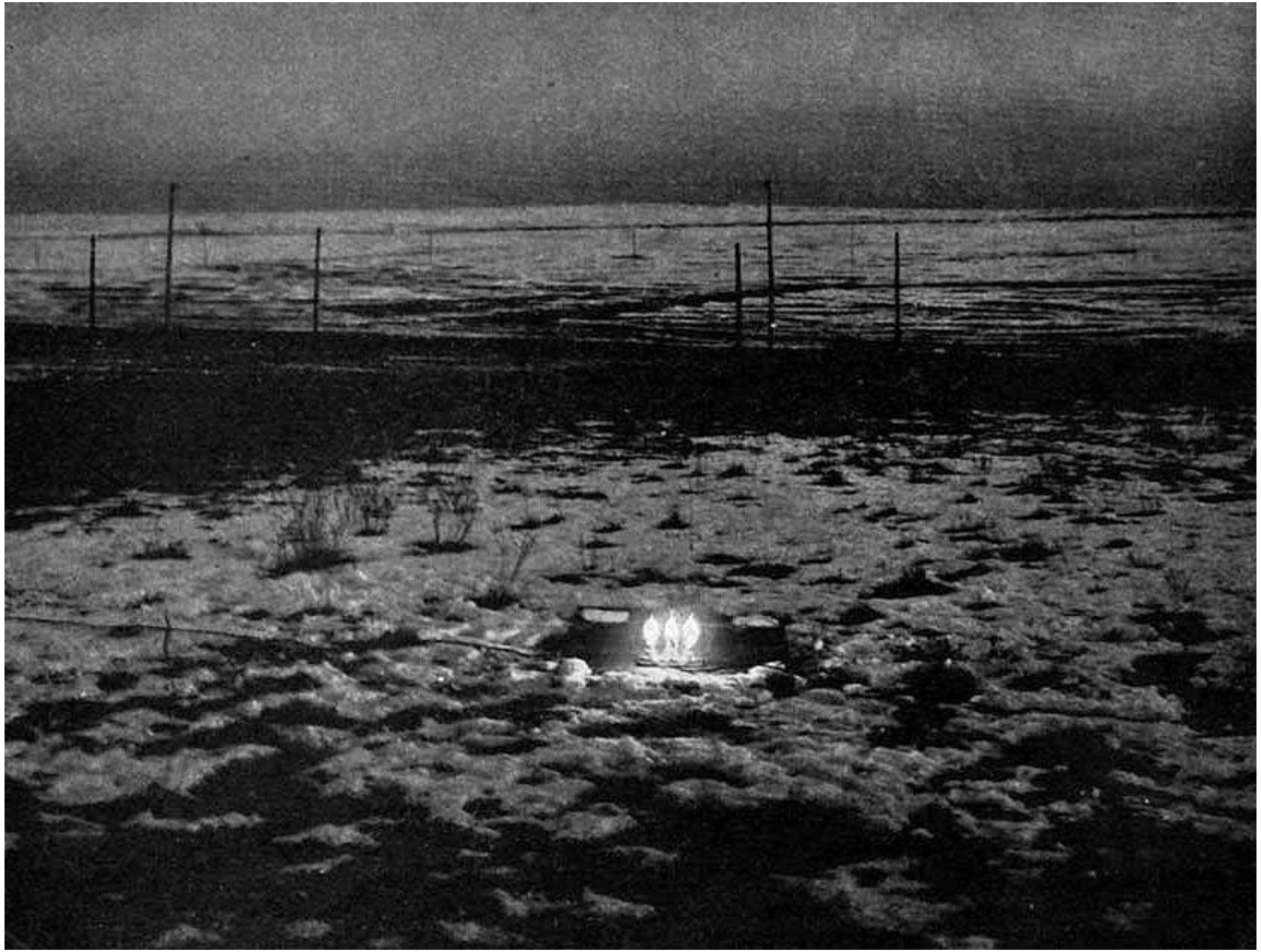


A multiple exposure picture (one of 68 images created by Century Magazine photographer Dickenson Alley) of Tesla sitting in his Colorado Springs laboratory with his "magnifying transmitter" generating millions of volts. The 7-metre (23 ft) long arcs were not part of the normal operation, but only produced for effect by rapidly cycling the power switch.

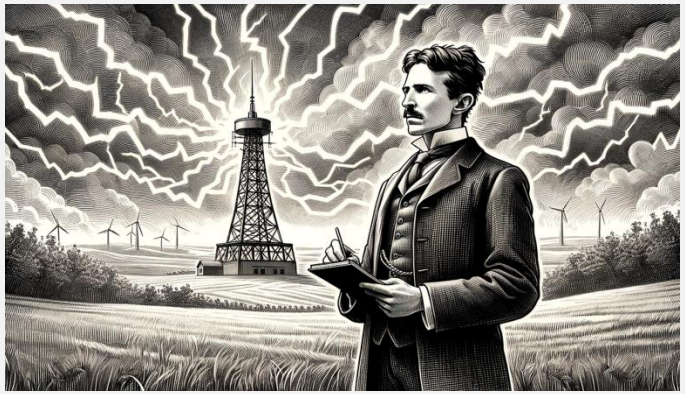
The Tesla Experimental Station was a laboratory in Colorado Springs, Colorado, USA built in 1899 by inventor Nikola Tesla and for his study of the use of high-voltage, high-frequency electricity in wireless power transmission. Tesla used it for only one year, until 1900, and it was torn down in 1904 to pay his outstanding debts.

In May 1899, Tesla, several of his assistants, and a local contractor commenced the construction of Tesla's laboratory shortly after arriving in Colorado Springs, a high-altitude location where he would have more room than in his downtown New York City laboratory for his high-voltage, high-frequency experiments. Tesla moved there to study the conductive nature of low pressure air, part of his research into wireless transmission of electrical power. The lab possessed the largest Tesla coil ever built, 49.25 feet (15.01 m) in diameter, which was a preliminary version of the magnifying transmitter planned for installation in the Wardenclyffe Tower. Upon his arrival, he told reporters that he planned to conduct wireless telegraphy experiments, transmitting signals from Pikes Peak to Paris.

He produced artificial lightning, with discharges consisting of millions of volts and up to 135 feet (41 m) long. People walking along the street observed sparks jumping between their feet and the ground. Sparks sprang from water line taps when touched. Light bulbs within 100 feet (30 m) of the lab glowed even when turned off. Horses in a livery stable bolted from their stalls after receiving shocks through their metal shoes. Butterflies were electrified, swirling in circles with blue halos of St. Elmo's fire around their wings.



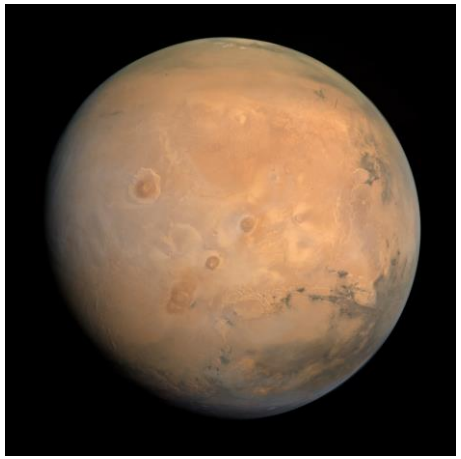
An Alley photograph from Colorado Springs documenting three lights receiving power by means of electrodynamic induction from an oscillator 60 feet (18 m) from the bulbs (placed on the ground outside the building to demonstrate they had no connection to the power source).



While experimenting, Tesla inadvertently faulted a power station generator, causing a power outage. In August 1917, Tesla explained what had happened in The Electrical Experimenter: "As an example of what has been done with several hundred kilowatts of high frequency energy liberated, it was found that the dynamos in a power house 6 miles (10 km) away were repeatedly burned out, due to the powerful high frequency currents set up in them, and which caused heavy sparks to jump through the windings and destroy the insulation!“

During his time at his laboratory Tesla observed unusual signals from his receiver which he concluded might be communications from another planet. He mentioned them in a letter to reporter Julian Hawthorne at the Philadelphia North American on 8 December 1899 and in a December 1900 letter about possible discoveries in the new century to the Red Cross Society where he referred to messages "from another world" that read "1 ... 2 ... 3 ...". Reporters treated it as a sensational story and jumped to the conclusion Tesla was hearing signals from Mars.

Mars is the fourth planet from the Sun. The surface of Mars is orange-red because it is covered in iron(III) oxide dust, giving it the nickname "the Red Planet". Mars is among the brightest objects in Earth's sky, and its high-contrast albedo features have made it a common subject for telescope viewing. It is classified as a terrestrial planet and is the second smallest of the Solar System's planets with a diameter of 6,779 km (4,212 mi). In terms of orbital motion, a Martian solar day (sol) is equal to 24.6 hours, and a Martian solar year is equal to 1.88 Earth years (687 Earth days). Mars has two natural satellites that are small and irregular in shape: Phobos and Deimos.

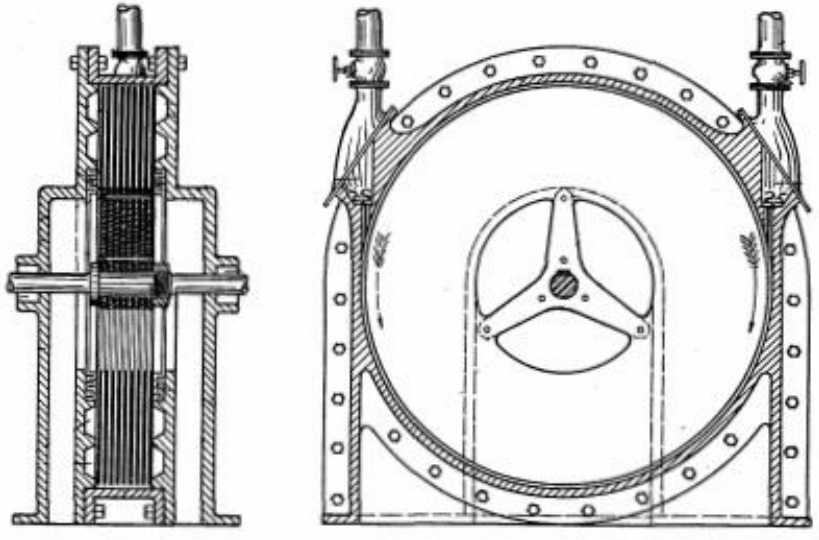


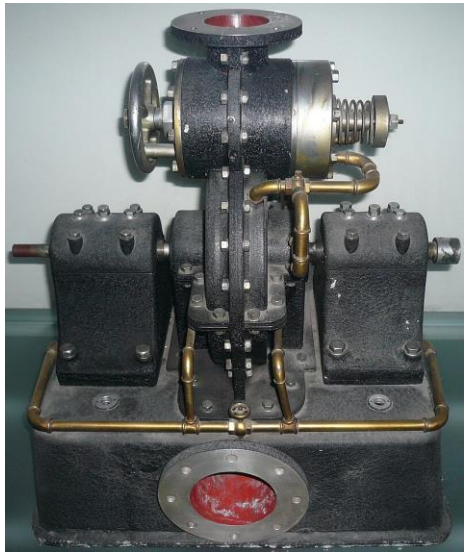
Investors on Wall Street were putting their money into Marconi's system, and some in the press began turning against Tesla's project, claiming it was a hoax. The project came to a halt in 1905, and in 1906, the financial problems and other events may have led to what Tesla biographer Marc J. Seifer suspects was a nervous breakdown on Tesla's part. Tesla mortgaged the Wardenclyffe property to cover his debts at the Waldorf-Astoria, which eventually amounted to $20,000 ($608,400 in today's dollars. He lost the property in foreclosure in 1915, and in 1917 the Tower was demolished by the new owner to make the land a more viable real estate asset.

Guglielmo Giovanni Maria Marconi, 1st Marchese of Marconi 25 April 1874 – 20 July 1937) was an Italian electrical engineer, inventor, physicist and politician known for his creation of a practical radio wave-based wireless telegraph system. This led to Marconi being credited as the inventor of radio and sharing the 1909 Nobel Prize in Physics with Karl Ferdinand Braun "in recognition of their contributions to the development of wireless telegraphy". His work laid the foundation for the development of radio, television and all modern wireless communication systems. From youth, Marconi was interested in science and electricity. In the early 1890s, he began working on the idea of "wireless telegraphy“

At the age of 20, Marconi began to conduct experiments in radio waves, building much of his own equipment in the attic of his home at the Villa Griffone in Pontecchio

After Wardenclyffe closed, Tesla continued to write to Morgan; after "the great man" died, Tesla wrote to Morgan's son Jack, trying to get further funding for the project. In 1906, Tesla opened offices at 165 Broadway in Manhattan, trying to raise further funds by developing and marketing his patents. He went on to have offices at the Metropolitan Life Tower from 1910 to 1914; rented for a few months at the Woolworth Building, moving out because he could not afford the rent; and then to office space at 8 West 40th Street from 1915 to 1925. After moving to 8 West 40th Street, he was effectively bankrupt. Most of his patents had run out and he was having trouble with the new inventions he was trying to develop.





The Tesla turbine is a bladeless centripetal flow turbine invented by Nikola Tesla in 1913. It functions as nozzles apply a moving fluid to the edges of a set of discs. The engine uses smooth discs rotating in a chamber to generate rotational movement due to the momentum exchange between the fluid and the discs. The discs are arranged in an orientation similar to a stack of CDs on an axle. The Tesla turbine uses the boundary-layer effect, instead of the method employed by more conventional turbines, wherein a fluid acts on blades. One of Tesla's intended implementations for this turbine was for the generation of geothermal power, which he described in his work Our Future Motive Power.

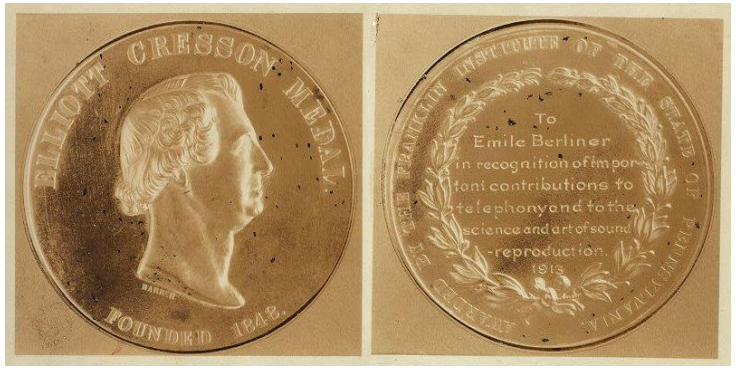
Wireless lawsuits

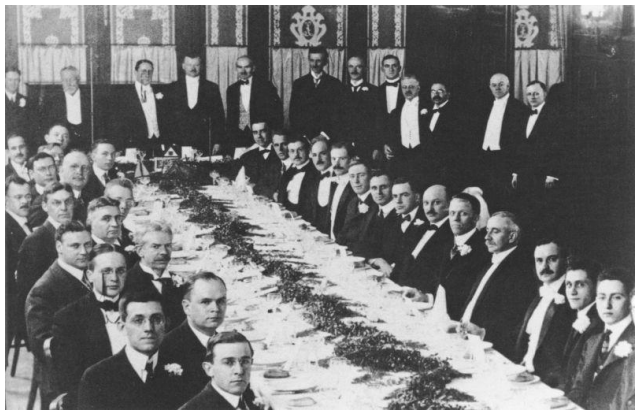
When World War I broke out, the British cut the transatlantic telegraph cable linking the US to Germany in order to control the flow of information between the two countries. They also tried to shut off German wireless communication to and from the US by having the US Marconi Company sue the German radio company Telefunken for patent infringement. Telefunken brought in the physicists Jonathan Zenneck and Karl Ferdinand Braun for their defense, and hired Tesla as a witness for two years for $1,000 a month. The case stalled and then went moot when the US entered the war against Germany in 1917.

In 1915, Tesla attempted to sue the Marconi Company for infringement of his wireless tuning patents. Marconi's initial radio patent had been awarded in the US in 1897, but his 1900 patent submission covering improvements to radio transmission had been rejected several times, before it was finally approved in 1904, on the grounds that it infringed on other existing patents including two 1897 Tesla wireless power tuning patents. Tesla's 1915 case went nowhere, but in a related case, where the Marconi Company tried to sue the US government over WWI patent infringements, a Supreme Court of the United States 1943 decision restored the prior patents of Oliver Lodge, John Stone, and Tesla. The court declared that their decision had no bearing on Marconi's claim as the first to achieve radio transmission, just that since Marconi's claim to certain patented improvements were questionable, the company could not claim infringement on those same patents.

Other awards, patents and ideas
Tesla won numerous medals and awards over this time. They include:

Grand Officer of the Order of St. Sava (Serbia, 1892)
Elliott Cresson Medal (Franklin Institute, US, 1894)
Grand Cross of the Order of Prince Danilo I (Montenegro, 1895)
Member of the American Philosophical Society (US, 1896)
AIEE Edison Medal (Institute of Electrical and Electronics Engineers, US, 1916)
Grand Cross of the Order of St. Sava (Yugoslavia, 1926)
Cross of the Order of the Yugoslav Crown (Yugoslavia, 1931)
John Scott Medal (Franklin Institute & Philadelphia City Council, US, 1934)
Order of the White Eagle (Yugoslavia, 1936)
Grand Cross of the Order of the White Lion (Czechoslovakia, 1937)
Medal of the University of Paris (Paris, France, 1937)
The Medal of the University St. Clement of Ochrida (Sofia, Bulgaria, 1939)

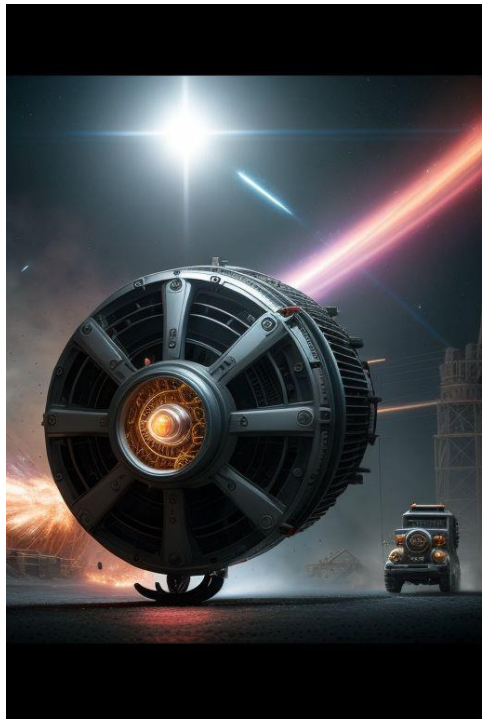


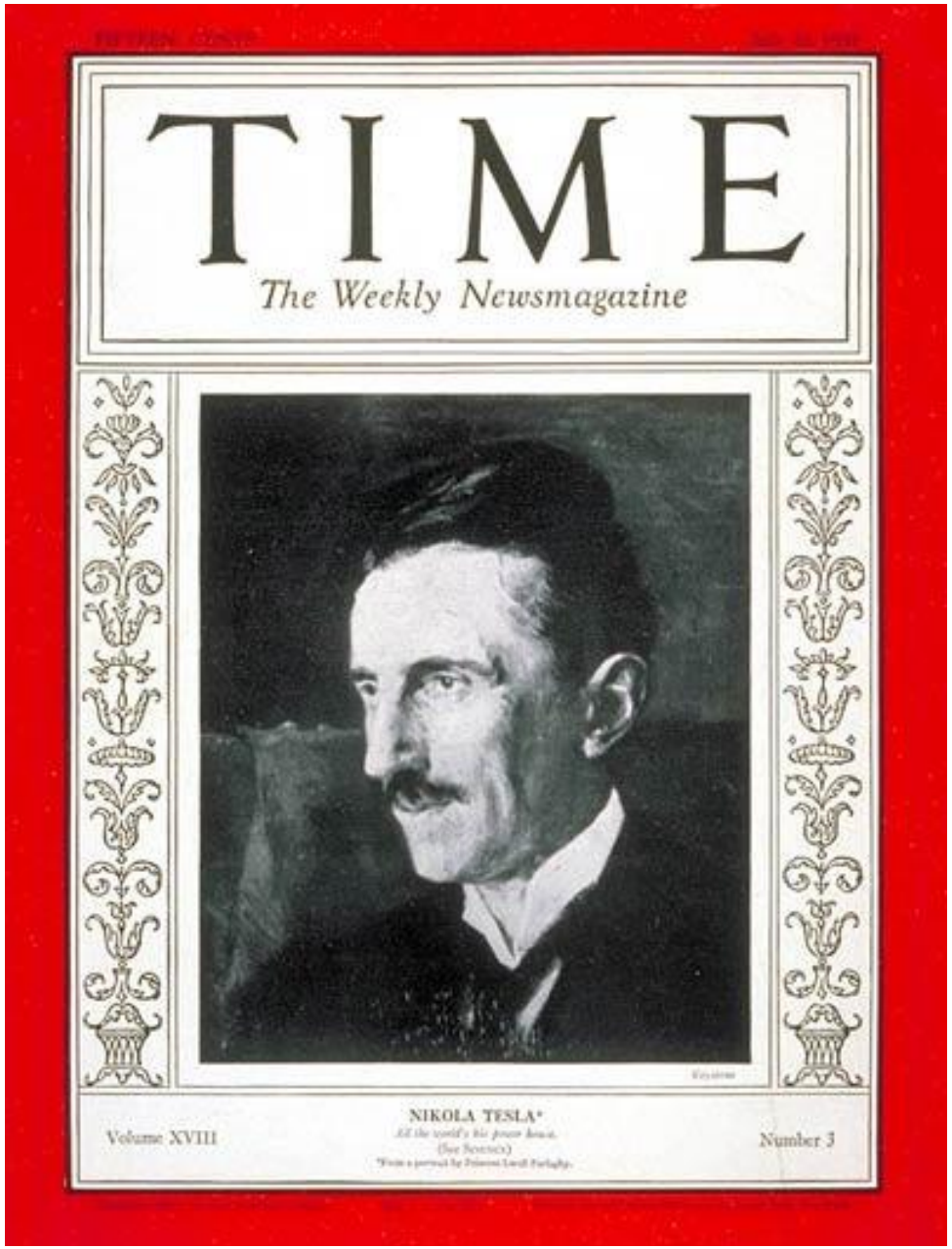


At the 1932 party, Tesla claimed he had invented a motor that would run on cosmic rays. In 1933, at age 77, Tesla told reporters at the event that, after 35 years of work, he was on the verge of producing proof of a new form of energy. He claimed it was a theory of energy that was "violently opposed" to Einsteinian physics and could be tapped with an apparatus that would be cheap to run and last 500 years. He also told reporters he was working on a way to transmit individualized private radio wavelengths, working on breakthroughs in metallurgy, and developing a way to photograph the retina to record thought.

At the 1934 occasion, Tesla told reporters he had designed a superweapon he claimed would end all war. He called it "teleforce", but was usually referred to as his death ray. In 1940, the New York Times gave a range for the ray of 250 miles (400 km), with an expected development cost of US$2 million (equivalent to $43.5 million in 2023).

At the 1932 party, Tesla claimed he had invented a motor that would run on cosmic rays. In 1933, at age 77, Tesla told reporters at the event that, after 35 years of work, he was on the verge of producing proof of a new form of energy. He claimed it was a theory of energy that was "violently opposed" to Einsteinian physics and could be tapped with an apparatus that would be cheap to run and last 500 years.





Tesla lived at the Waldorf Astoria in New York City from 1900 and ran up a large bill. He moved to the St. Regis Hotel in 1922 and followed a pattern from then on of moving to a different hotel every few years and leaving unpaid bills behind.

Tesla walked to the park every day to feed the pigeons. He began feeding them at the window of his hotel room and nursed injured birds back to health. He said that he had been visited by a certain injured white pigeon daily. He spent over $2,000 (equivalent to $36,410 in 2023) to care for the bird, including a device he built to support her comfortably while her broken wing and leg healed. Tesla's unpaid bills, as well as complaints about the mess made by pigeons, led to his eviction from St. Regis in 1923. He was also forced to leave the Hotel Pennsylvania in 1930 and the Hotel Governor Clinton in 1934. At one point he also took rooms at the Hotel Marguery. Tesla moved to the Hotel New Yorker in 1934. At this time Westinghouse Electric & Manufacturing Company began paying him $125 (equivalent to $2,850 in 2023) per month in addition to paying his rent.

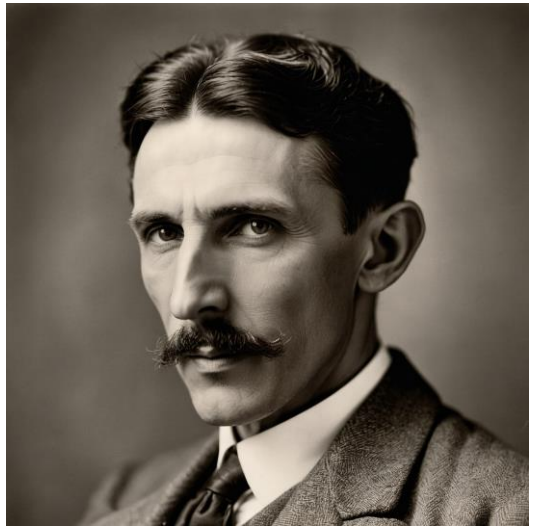
Tesla on Time magazine commemorating his 75th birthday

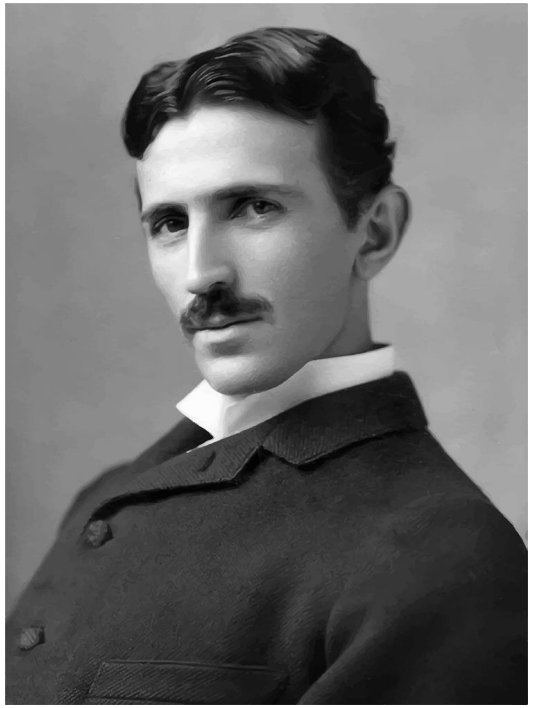
3327
The Nikola Tesla Room
The great inventor Nikola Tesla occupied this room from 1933 to 1943.
He invented the system of AC electrical power that is used throughout the world today,
including the generator, motor and method of transmission.
He also holds the patent for wireless communication.
Perhaps his most famous project is the electrical powerplant at Niagara Falls, NY.

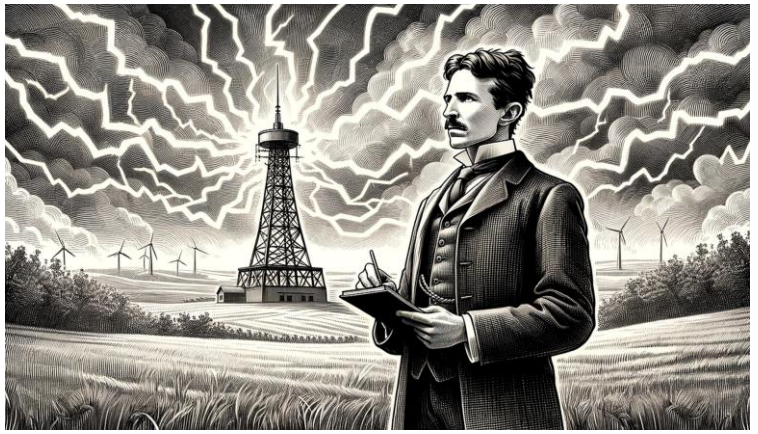
Room 3327 of the Hotel New Yorker, where Tesla died

In the fall of 1937 at the age of 81, after midnight one night, Tesla left the Hotel New Yorker to make his regular commute to the cathedral and library to feed the pigeons. While crossing a street a couple of blocks from the hotel, Tesla was struck by a moving taxicab and was thrown to the ground. His back was severely wrenched and three of his ribs were broken in the accident. The full extent of his injuries was never known; Tesla refused to consult a doctor, an almost lifelong custom, and never fully recovered.

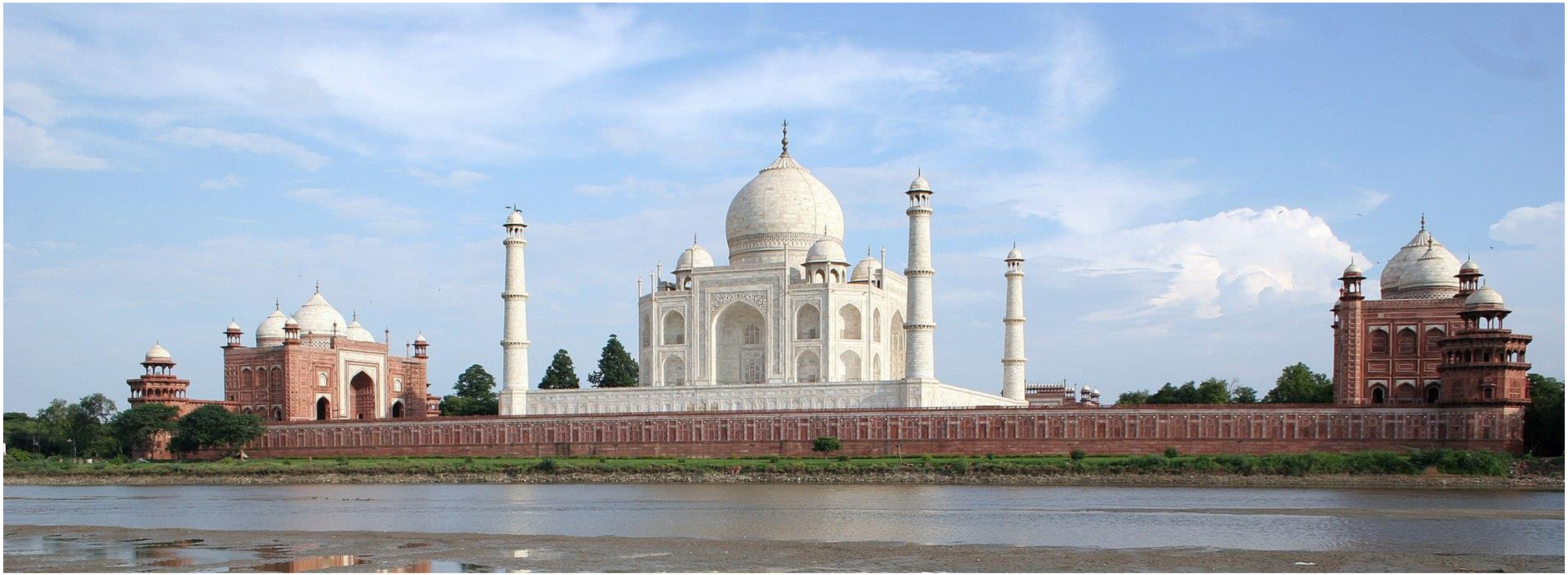
On 7 January 1943, at the age of 86, Tesla died alone in Room 3327 of the Hotel New Yorker. His body was found by maid Alice Monaghan when she entered Tesla's room, ignoring the "do not disturb" sign that Tesla had placed on his door two days earlier. Assistant medical examiner H.W. Wembley examined the body and ruled that the cause of death had been coronary thrombosis (a type of heart attack).







Taj Mahal



Taj Mahal

The Taj Mahal lit. 'Crown of the Palace') is an ivory-white marble mausoleum on the right bank of the river Yamuna in Agra, Uttar Pradesh, India. It was commissioned in 1631 by the fifth Mughal emperor, Shah Jahan (r. 1628–1658) to house the tomb of his beloved wife, Mumtaz Mahal; it also houses the tomb of Shah Jahan himself. The tomb is the centrepiece of a 17-hectare (42-acre) complex, which includes a mosque and a guest house, and is set in formal gardens bounded on three sides by a crenellated wall.

Construction of the mausoleum was completed in 1648, but work continued on other phases of the project for another five years. The first ceremony held at the mausoleum was an observance by Shah Jahan, on 6 February 1643, of the 12th anniversary of the death of Mumtaz Mahal. The Taj Mahal complex is believed to have been completed in its entirety in 1653 at a cost estimated at the time to be around ₹5 million, which in 2023 would be approximately ₹35 billion (US$77.8 million).

The building complex incorporates the design traditions of Indo-Islamic and Mughal architecture. It employs symmetrical constructions with the usage of various shapes and symbols. While the mausoleum is constructed of white marble inlaid with semi-precious stones, red sandstone was used for other buildings in the complex similar to the Mughal era buildings of the time. The construction project employed more than 20,000 workers and artisans under the guidance of a board of architects led by Ustad Ahmad Lahori, the emperor's court architect.

Taj Mahal

The Taj Mahal was designated as a UNESCO World Heritage Site in 1983 for being "the jewel of Islamic art in India and one of the universally admired masterpieces of the world's heritage". It is regarded as one of the best examples of Mughal architecture and a symbol of Indian history. The Taj Mahal is a major tourist attraction and attracts more than five million visitors a year. In 2007, it was declared a winner of the New 7 Wonders of the World initiative.

Taj Mahal

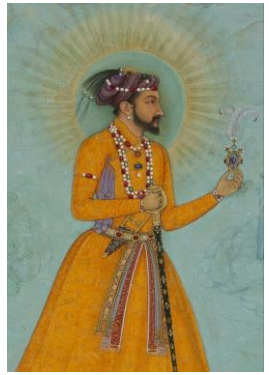
Etymology

The name "Taj Mahal" is of Urdu origin, and believed to be derived from Arabic and Persian, with the words tāj mahall meaning "crown" (tāj) "palace" (mahall). Abdul Hamid Lahori, in his book from 1636 Padshahnama, refers to the Taj Mahal as rauza-i munawwara (Perso-Arabic: روضه منواره, **rawdah-i munawwarah), meaning the illumined or illustrious tomb. The name "Taj" might have been derived from the corruption of the second syllable of "Mumtaz"**

The Taj Mahal was commissioned by Shah Jahan in 1631, to be built in the memory of his wife Mumtaz Mahal, who died on 17 June that year while giving birth to their 14th child, Gauhara Begum. Construction started in 1632, and the mausoleum was completed in 1648, while the surrounding buildings and garden were finished five years later. The imperial court documenting Shah Jahan's grief after the death of Mumtaz Mahal illustrates the love story held as the inspiration for the Taj Mahal. According to contemporary historians Muhammad Amin Qazvini, Abdul Hamid Lahori and Muhammad Saleh Kamboh, Shah Jahan did not show the same level of affection for others as he had shown Mumtaz while she was alive.

After her death, he avoided royal affairs for a week due to his grief and gave up listening to music and lavish dressing for two years. Shah Jahan was enamored by the beauty of the land at the south side of Agra on which a mansion belonging to Raja Jai Singh I stood. He chose the place for the construction of Mumtaz's tomb after which Jai Singh agreed to donate it to the emperor.

Shah Jahan, 17th century painting

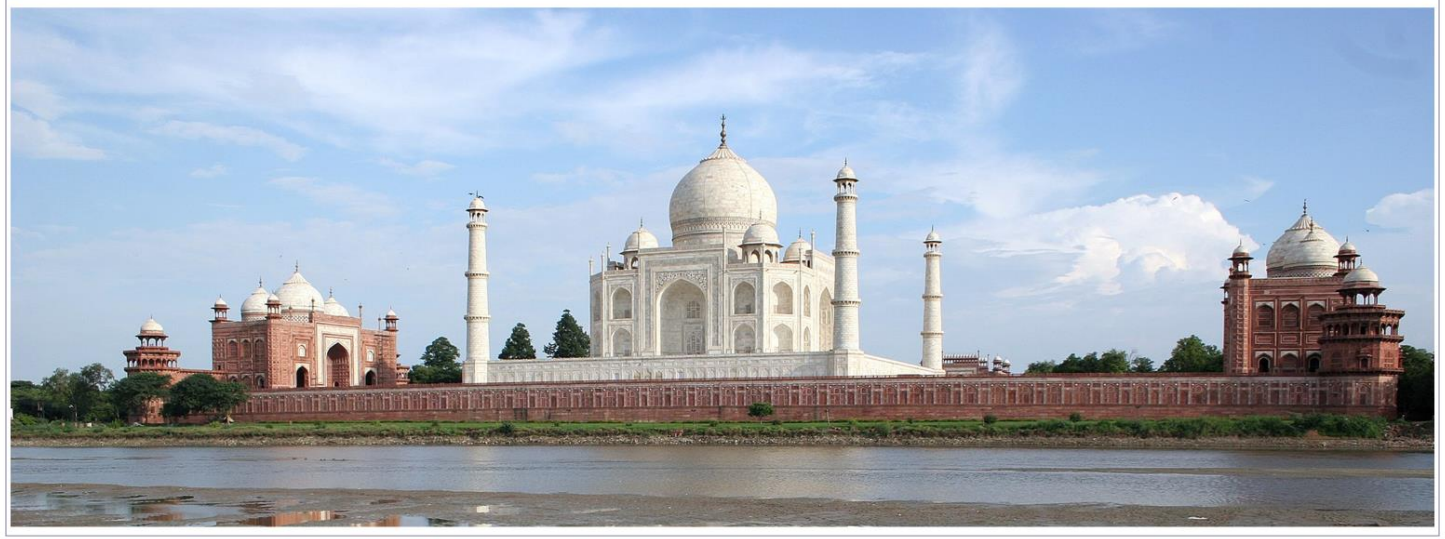


Artistic depiction of Mumtaz Mahal

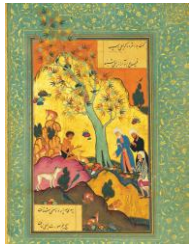
Taj Mahal

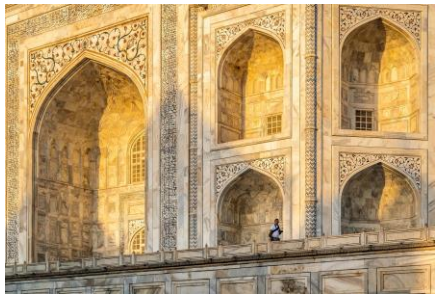
The Taj Mahal represents the finest and most sophisticated example of Indo-Islamic architecture. Its origins lie in the moving circumstances of its commission and the culture and history of an Islamic Mughal empire's rule of large parts of India. The distraught Mughal Emperor Shah Jahan commissioned the project upon the death of one of his favorite wives Mumtaz Mahal.

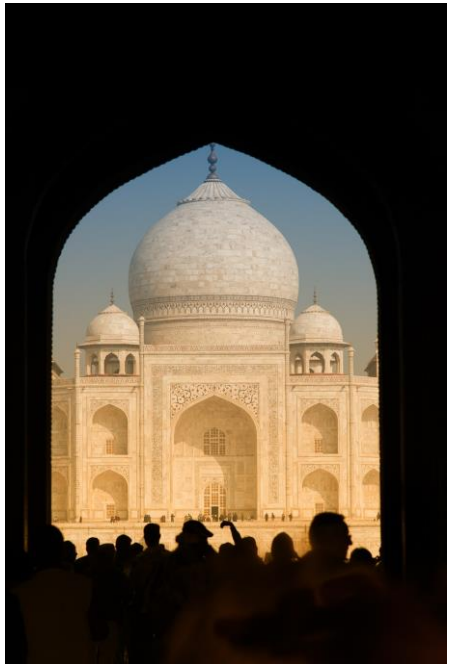
Taj Mahal



Taj Mahal has become a prominent image that is associated with India.

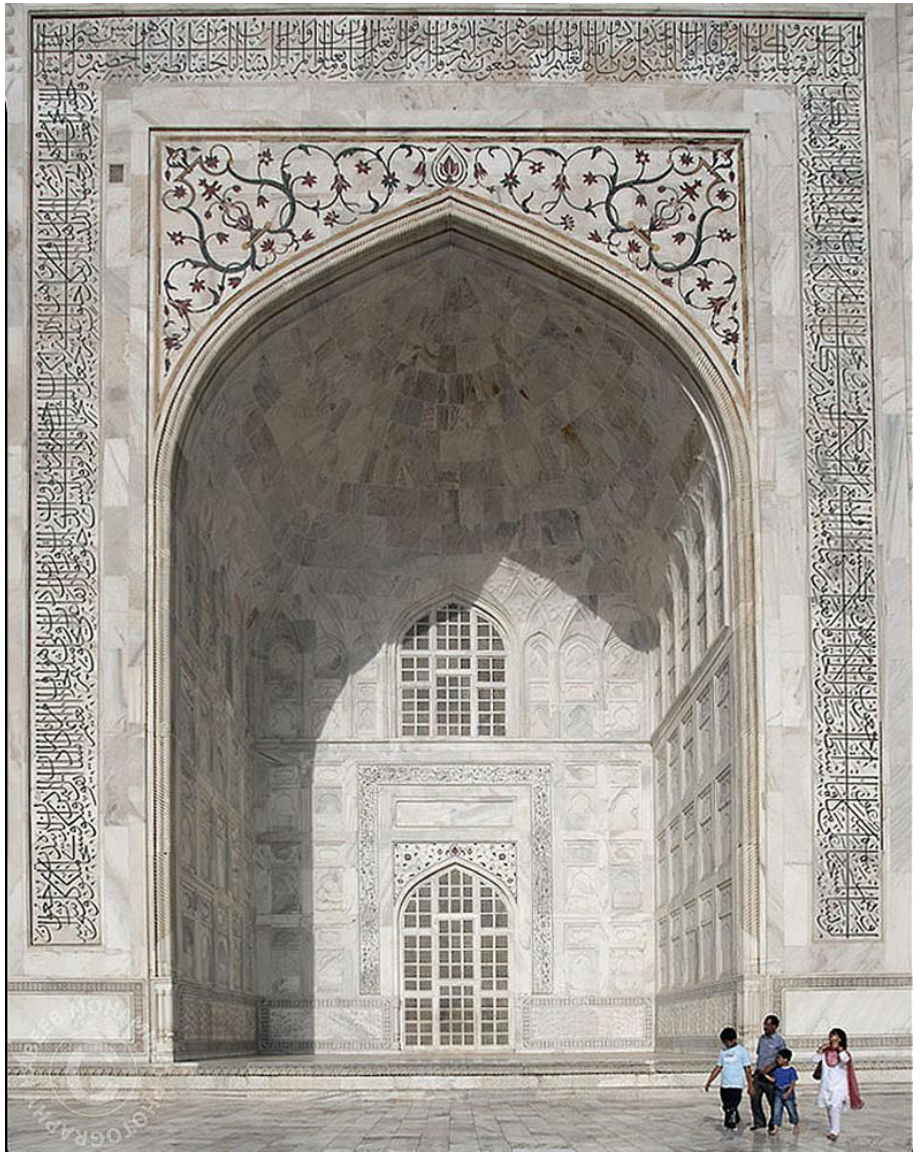






Taj Mahal

The Taj Mahal incorporates and expands on design traditions of Indo-Islamic and Mughal architecture. Inspirations for the building came from Timurid and Mughal buildings including the Gur-e Amir in Samarkand (the tomb of Timur, progenitor of the Mughal dynasty) and Humayun's Tomb in Delhi which inspired the Charbagh gardens and hasht-behesht plan of the site. The building complex employs symmetrical constructions with the usage of various shapes and symbols. While the mausoleum is constructed of white marble inlaid with semi-precious stones, red sandstone was used for other buildings in the complex similar to the Mughal era buildings of the time. The entire complex sits on platform measuring 300 metres (980 ft) in length and 8.7 metres (28.5 ft) in height on the banks of Yamuna river. The platform is built with varying patterns of dark and light colored sandstone.



The mausoleum building is the central structure of the entire complex. It is a white marble structure standing on a 6-metre (20 ft) high square plinth with sides measuring 95.5 metres (313 ft) in length. The base structure is a large multi-chambered cube with chamfered corners forming an eight-sided structure that is approximately 57.3 metres (188 ft) long on each of the four long sides,

The building has four identical sides with iwans (arch-shaped doorways), topped by a large dome and finial.

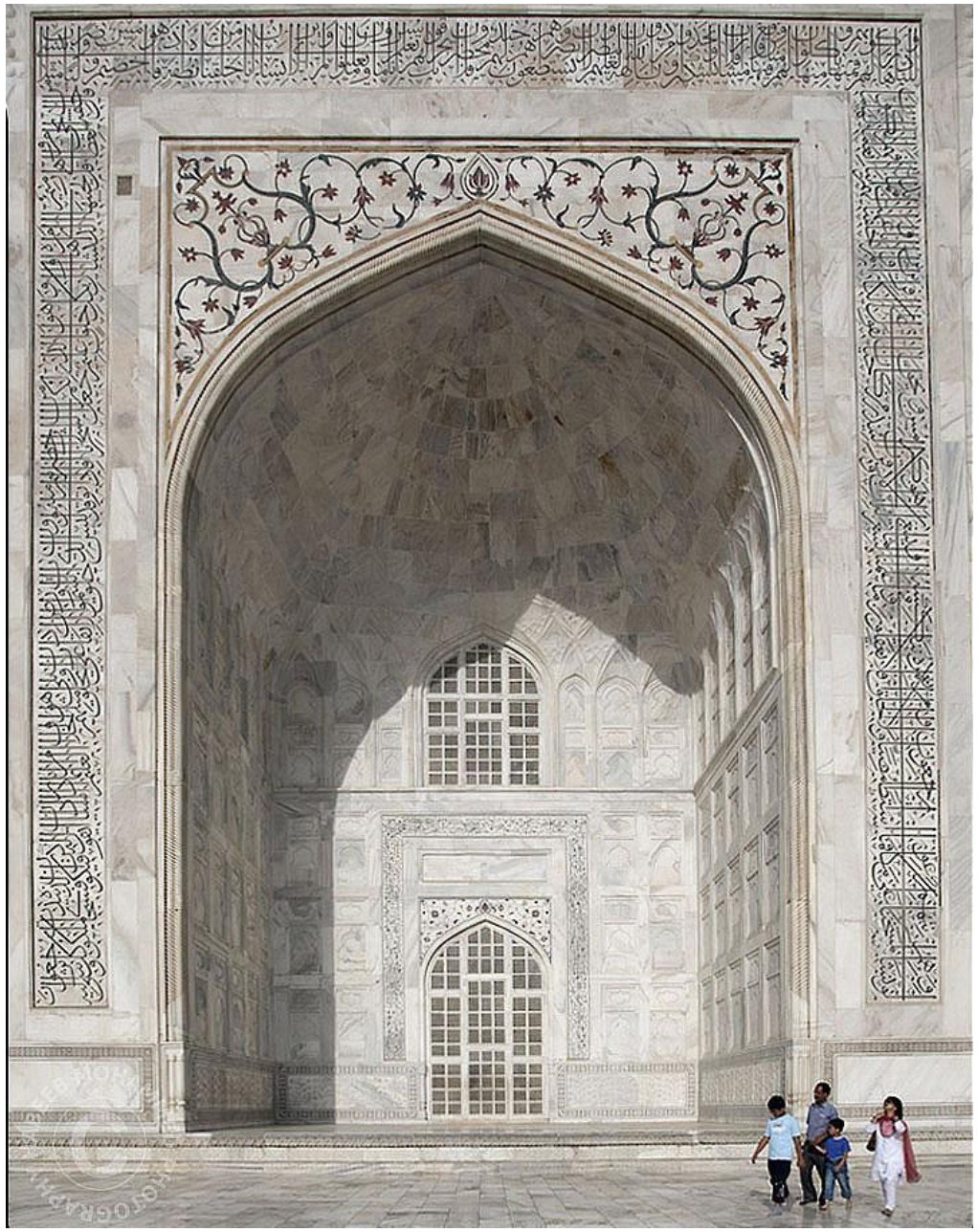
Each side of the iwan is framed with a 33-metre (108 ft) high pishtaq (vaulted archway) with two similarly shaped arched balconies stacked on either side. This motif of archways is replicated on a smaller scale on the chamfered corner areas, making the design completely symmetrical. At the southern side of the platform, facing the garden, there are two flights of stairs on either side which are partly covered and provide the only access from ground level up to the mausoleum building.

The predominant feature of the mausoleum is the 23-metre (75 ft) high marble dome that surmounts the tomb. The onion shaped dome sits on a 12-metre (39 ft) high cylindrical drum with an inner diameter of 18.4 metres (60 ft). The dome is slightly asymmetrical and is topped by a 9.6-metre (31 ft) high gilded finial. The intermediate zone between the drum and the dome is supplanted by an ornamental moulding with a twisted rope design.

The main dome is surrounded by four smaller domes or chattris placed at its corners, which replicate the onion shape of the main dome. The smaller domes are supported by columns which stand on the top of the main structure and help bring light to the interior of the building. Tall spires called guldastas extend from edges of walls which serve as decorative elements. The main and the smaller domes are decorated with a design resembling a lotus flower. The domes are topped by decorative finials which uses Persian and Indian design elements. The main finial was originally made of gold but was replaced by a copy made of gilded bronze in the early 19th century. The finial is topped by a moon, a typical Islamic motif, whose horns point heavenward.

Four minarets flank the tomb building, one at each corner of the plinth facing the chamfered corners.

The four minarets, which are each more than 40 metres (130 ft) tall, are symmetrically arranged on the corners facing the chamfered corners of the main building. Each minaret is composed of three almost equal parts with balconies at the intersection of the portions. The towers are also surmounted by smaller chattris and incorporate the same design elements as the main dome with a finial. Steps lead to the top of the tower with rectangular openings below the domes providing light and air on the top. The minarets were designed similar to traditional elements of a mosque, which are used by the muezzin to call for prayer. The minarets were constructed slightly oriented towards the outside of the plinth so that in the event of collapse, the material from the towers would tend to fall away from the tomb.



The external surfaces of the building are decorated with a number of delicate relief art adorned with various precious and semi-previous stones. The decorative elements were created by applying paint, stucco, stone inlays or carvings. In line with the Islamic prohibition against the use of anthropomorphic forms, the decorative elements can be grouped into either calligraphy, abstract forms or vegetative motifs. The white marble dados consist of ornamental bas relief depictions of nature and plant based elements. The marble has been polished to emphasise the exquisite detailing of the carvings and the frames and archway spandrels are decorated with pietra dura inlays of stylised geometric pattern of vines, flowers and fruits.

The domes and vaults of the sandstone buildings are worked with tracery of incised painting to create elaborate geometric forms.

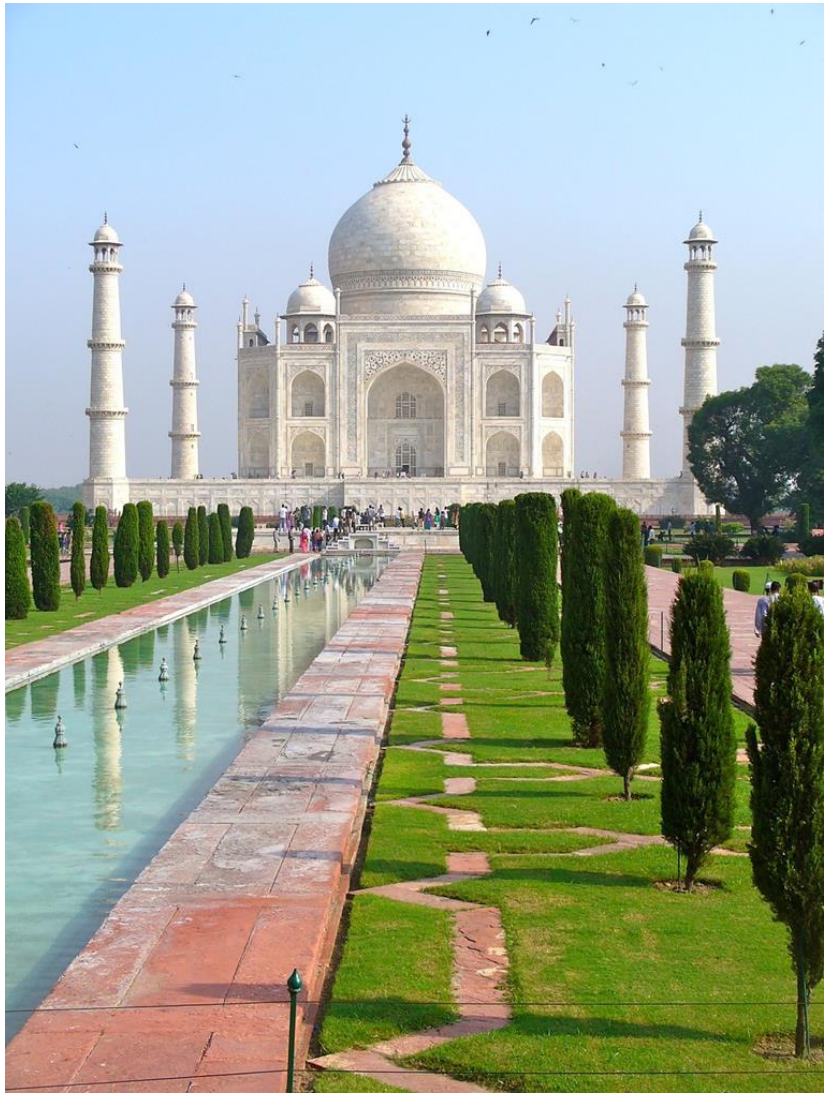
Southern facade showing the great pishtaq, jali windows and calligraphy

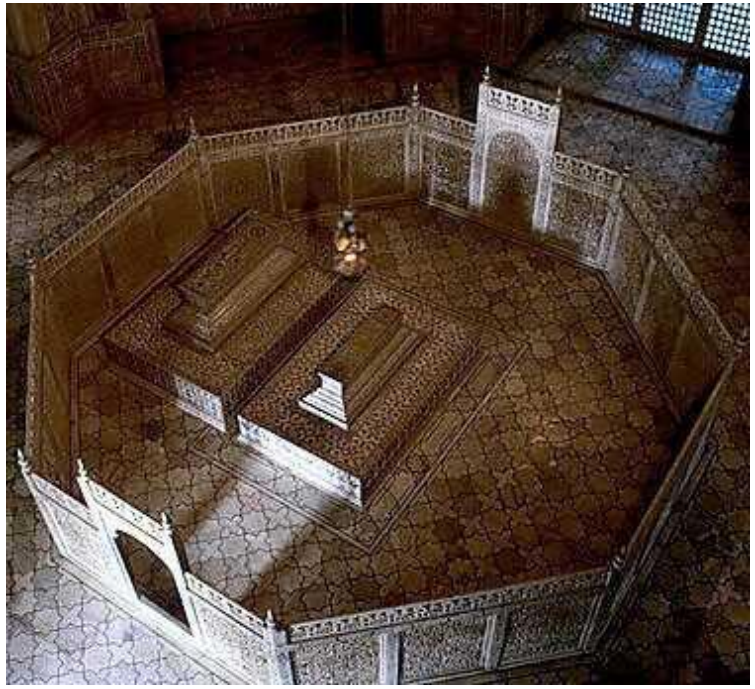
Herringbone inlays define the space between the adjoining elements. White inlays are used in sandstone buildings, and dark or black inlays on the white marbles. Contrasting colors have been used to create a complex array of different geometric patterns across the mortared areas of the buildings.

Taj Mahal

The floors and walkways are laid with tiles or blocks with contrasting colors and consisting of various tessellation patterns. The plinth is differentiated from the paved surface of the main platform by an interlocking pattern of octagonal white marble pieces set into four pointed stars made of red sandstone, surrounded by a border. The building has many lattice windows or jalis with interlocking hexagonal patterns.

The gateway arches are bordered by Arabic calligraphy with passages from the Qur'an. Much of the calligraphy is composed of florid thuluth script made of jasper or black marble inlaid in white marble panels. Higher panels are written with slightly larger script to reduce the skewing effect when viewed from below. The calligraphy on the southern gate roughly translates to "O Soul, thou art at rest. Return to the Lord at peace with Him, and He at peace with you. The calligraphy on the buildings were believed to have been created in 1609 by Abdul Haq, who was conferred the title of "Amanat Khan" by Shah Jahan. At the base of the interior dome is the inscription, "Written by the insignificant being, Amanat Khan Shirazi".





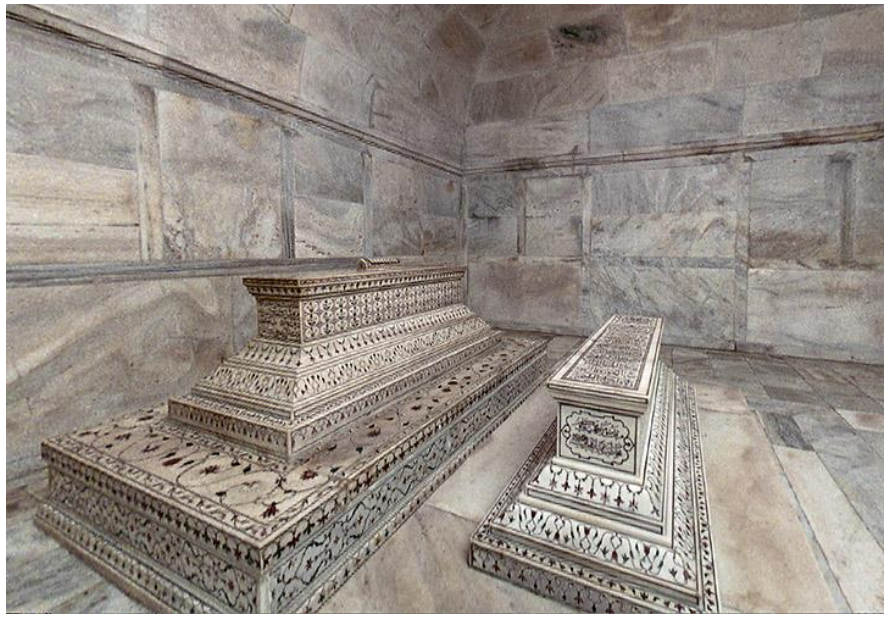
The main inner chamber is an octagon with 7.3-metre (24 ft) sides, with the design allowing for entry from each face with the main door facing the garden to the south. Two tiers of eight pishtaq arches are located along the walls, similar to the exterior. The four central upper arches form balconies or viewing areas, and each balcony's exterior window has an intricate jali. The inner wall is open along the axes where jali screens are fitted which transmit light from the exterior to the interior of the main chamber. Except the south side, other three sides consist of an open elongated room flanked by two square cells covered with decorated ceilings set on the platform. The central room has arched openings on three sides fitted with jalis filled with panes of glass and a small rectangular window cut into the central jali. The square cells which are reached through separate doors were probably originally used for visitors and Qur'an reciters as a place to rest. Staircases lead from the ground floor to the roof level, where there are corridors between the central hall and the two corner rooms in the south with a system of ventilation shafts. The interior walls are about 25 metres (82 ft) high and are topped by a "false" interior dome decorated with a sun motif. The inlay work is a lapidary of precious and semiprecious gemstones.
Each chamber wall is highly decorated with dado bas-relief, intricate lapidary inlay and refined calligraphy panels similar to the design elements seen throughout the exterior of the complex.

Taj Mahal

The main chamber houses the false sarcophagi of Mumtaz Mahal and Shah Jahan, while the real ones are in the basement. Perforated marble jalis (mahjar-i mushabbak) border the cenotaphs and are made from eight marble panels carved through with intricate pierce work inlaid in delicate detail with semi-precious stones. The cenotaphs were originally covered by a screen made of gold on the occasion of the second anniversary of Mumtaz Mahal's death in 1633, which was later replaced by the marble screen in 1643.

Situated within the screen in the upper main chamber are the likenesses of the tombs of Mumtaz Mahal and Shah Jahan with the actual burials done below in the lower tomb chamber. From the southern main entrance room, a stairway leads to the lower tomb chamber which is rectangular in shape with walls laid with marble and an undecorated coved ceiling.

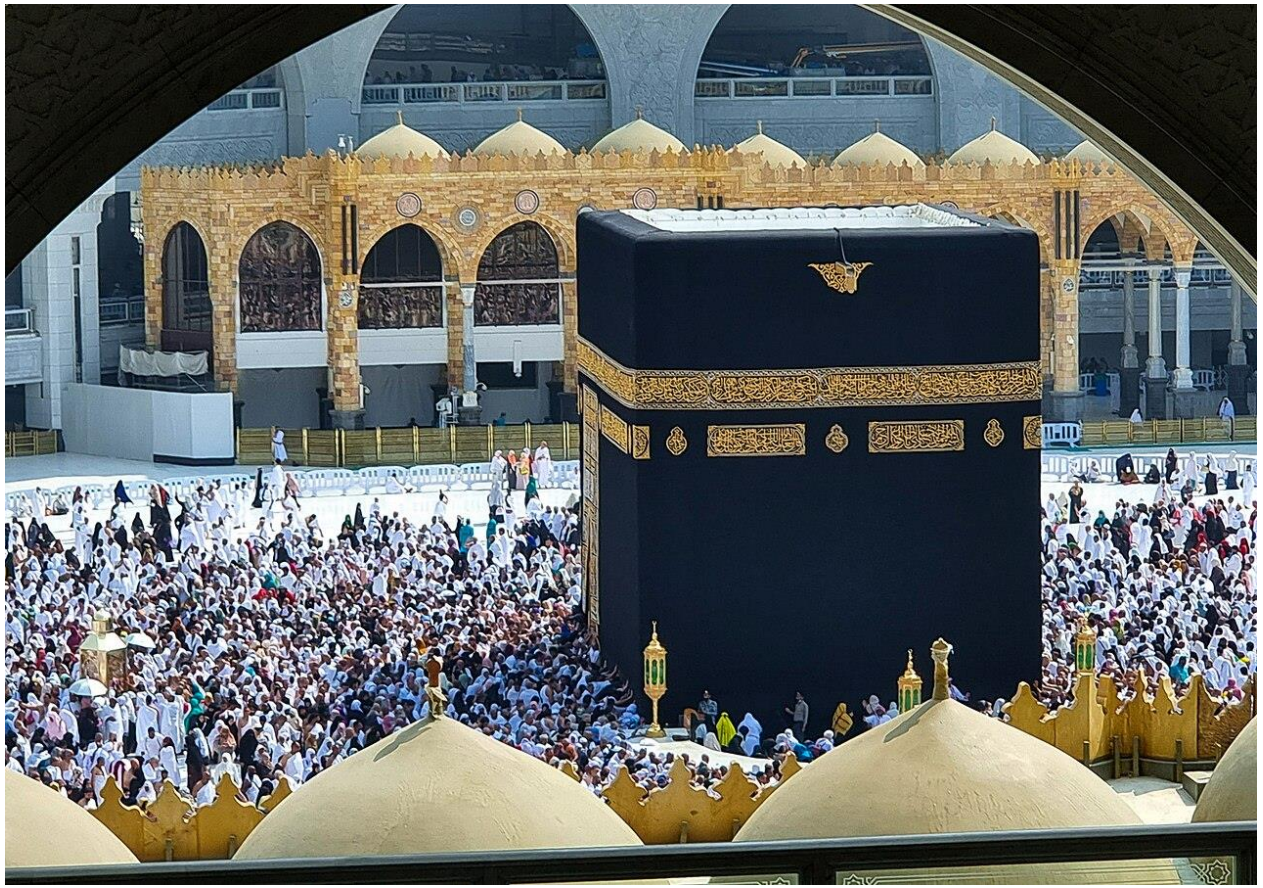
The false sarcophagi of Mumtaz Mahal and Shah Jahan in the main chamber



The actual sarcophagi of Mumtaz Mahal

Taj Mahal

The cenotaph of Mumtaz is located in the exact center of the chamber on a marble base of 1.5 by 2.5 metres (4 ft 11 in by 8 ft 2 in). Shah Jahan's cenotaph is situated on a larger base on the western side in an asymmetrical arrangement. On the top is a traditional sculpture of a small pen box denoting it as a male tomb. The cenotaphs are aligned north–south, with the head towards the north and the bodies were laid in on their sides with the face turned towards the west, facing Mecca.



The Kabah in the Grand Mosque of Makkah from the second floor, Saudi Arabia

Taj Mahal

The calligraphy found on the marble cenotaphs in the tomb is particularly detailed and delicate. While the cenotaphs are similar to the ones from the Mughal era, no other tombs from the era were adorned with such an exquisite decoration. On Mumtaz's sarcophagus on the top, the decoration consists of natural plum fruits, buds and flower blossoms inlaid with Qur'anic inscriptions with the epitaph reading "The illumined grave of Arjumand Bano Begam, entided Mumtaz Mahal, who died in the year 1631". The original tomb in the lower level is largely undecorated, with Ninety Nine Names of God inscribed on the side. The false cenotaph of Shah Jahan has similar decorations and is covered with flowers and other scroll work without any inscriptions. The epitaph surrounded by red poppy flowers reads "This is the sacred grave of His Most Exalted Majesty, Dweller in Paradise (Firdaus Ashiyani), Second Lord of the Auspicious.

Conjunction (Sahib-i Qiran-i Sani), Shah Jahan, Padshah; may it ever be fragrant! The year 1076 [AD 1666]". The original cenotaph of Shah Jahan is a more simply decorated version with similar red flowers and yellow plants with a more comprehensive epitaph reading "This is the illumined grave and sacred resting place of the emperor, dignified as Rizwan, residing in Eternity, His Majesty, having his abode in [the celestial realm of] Illiyun, Dweller in Paradise (Firdaus Ashiyani) [posthumous title of Shah Jahan], the Second Sahib-i Qiran, Shah Jahan, Padshah Ghazi [Warrior for the Faith]; may it be sanctified and may Paradise become his abode. He travelled from this world to the banquet hall of eternity on the night of the twenty-sixth of the month of Rajab, in the year one thousand and seventy-six Hijri January AD 1666]

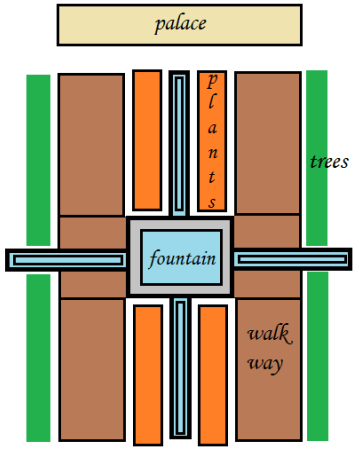
Taj Mahal

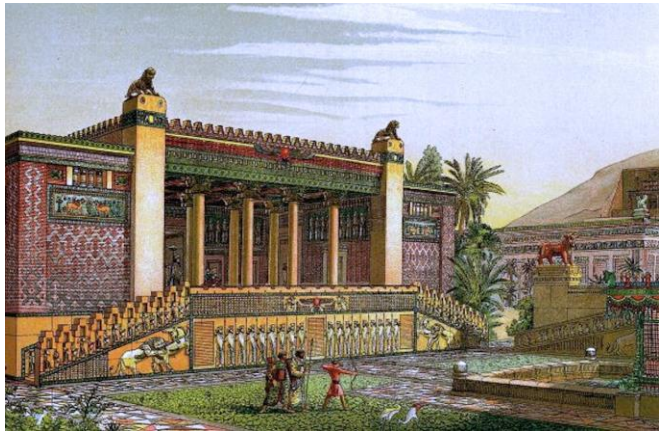
Taj Mahal

The complex is set around a large 300 m2 (3,200 sq ft) charbagh or Mughal garden. The garden is divided by two main walkways (khiyaban) into four quadrants with further raised pathways that divide each of the four-quarters into 16 sunken parterres or flowerbeds. The garden is surrounded by a walkway connecting all the quadrants. Halfway between the tomb and gateway in the centre of the garden is a raised marble water tank with five fountains and a reflecting pool positioned on a north–south axis to reflect the image of the mausoleum. The elevated marble water tank is called al Hawd al-Kawthar in reference to the "Tank of Abundance" promised to Muhammad. Elsewhere, the garden is laid out with avenues of trees and fountains. In the north-western quadrant, is a place that marks the site where Mumtaz Mahal was first buried, before her body was moved to its final resting place inside the main chamber of the mausoleum

Taj Mahal

The charbagh garden, a design inspired by Persian gardens, was introduced to India by Babur, the first Mughal emperor and symbolises the Paradise garden (Jannah) with four rivers flowing from a central spring or mountain, separating the garden into north, west, south and east. While most gardens of the era are rectangular with a tomb or pavilion in the centre, the Taj gardens is unusual in that the main element, the tomb, is located at the end of the garden. With the discovery of Mahtab Bagh ("Moonlight Garden") on the other side of the Yamuna river, the Archaeological Survey of India has hypothesised that the Yamuna river itself was incorporated into the garden's design and was meant to be seen as one of the rivers of Paradise. Similarities in layout and architectural features with the Shalimar Gardens suggest that both gardens may have been designed by the same architect, Ali Mardan. Early accounts of the garden describe its profusion of vegetation, including abundant roses, daffodils, and fruit trees. As the Mughal Empire declined, the gardens were not maintained, and when the British Raj assumed management of the gardens, they changed the landscaping to resemble the formal lawns of London in the 19th century.





Mosque at the Taj Mahal complex in Agra, India

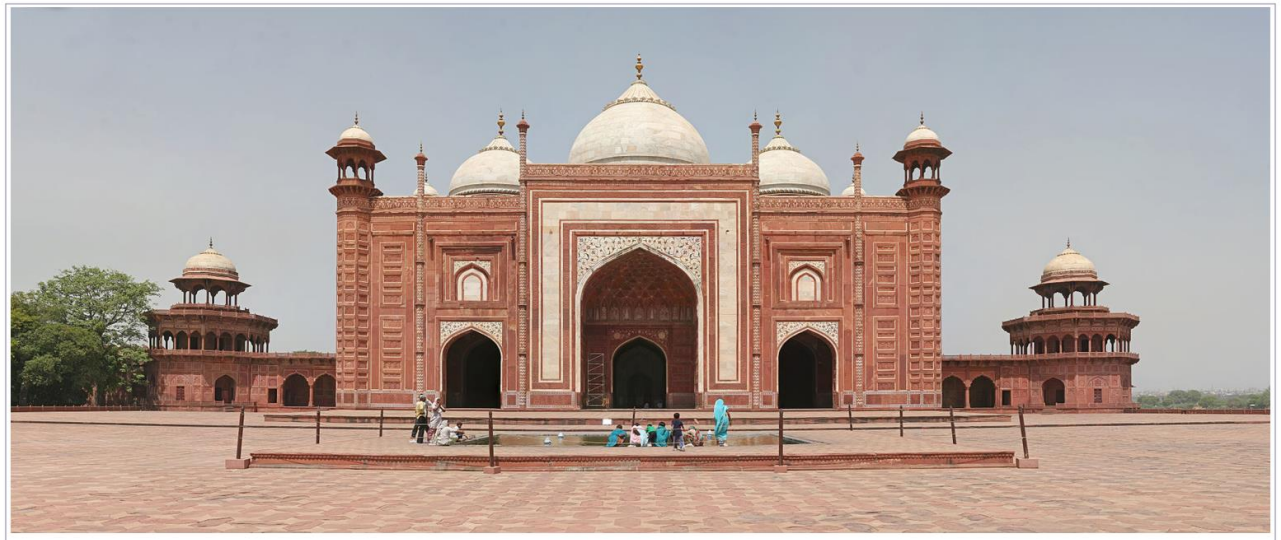
Taj Mahal

The water supply for the gardens were derived from the Yamuna River, where a water channel transported the water into an underground reservoir along the eastern wall of a storage building containing multiple storage tanks. The water from the reservoir was lifted by means of a system of pulleys and wheels, turned by animals, to a tank that supplied an aqueduct which ran south carrying water up to the western wall before turning east. The water was later distributed throughout the garden through earthenware pipes embedded underground. The fountains in the central tank consisted of large vessels made of copper and inter-connected through copper pipes and the drop from the 9.47 m (31.1 ft) high walls created the necessary water for the fountains.

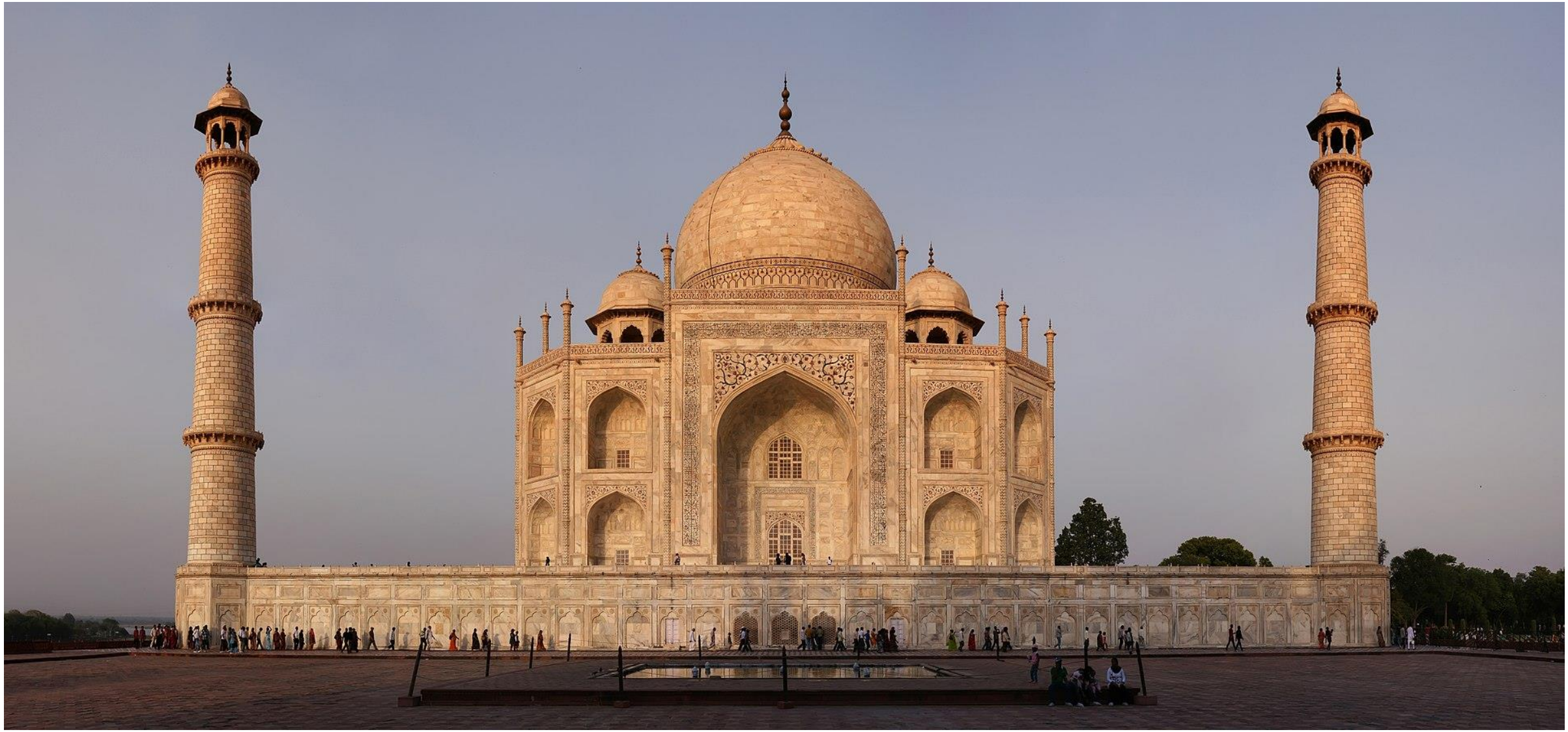
The marble pavilion.. In the third terrace of shalimar Garden the axial water channel flows through the Zenana garden, which is flanked by the Diwan-e-Khas and chinar trees. At the entrance to this terrace, there are two small pavilions or guard rooms (built in Kashmir style on stone plinth) that is the restricted and controlled entry zone of the royal harem. Shahajahan built a baradari of black marble, called the Black Pavilion in the zenana garden. It is encircled by a fountain pool that receives its supply from a higher terrace.

Taj Mahal

The Taj Mahal complex is enclosed by crenellated red sandstone walls on three sides, with the side facing the Yamuna river left open. Outside the complex walls, there are other mausoleums dedicated to Shah Jahan's other wives, royals and favorite servants. The inner sides of the walls feature columned arcades typical of Hindu temples, adorned with domed cuppola like chattris and smaller structures like the Music House interspersed between them. The main gateway, primarily built of marble, mirrors the tomb's architecture and incorporates intricate decorations like bas-relief and pietra dura inlays. At the far end of the complex stand two similar buildings built of red sandstone, one of which is designated as a mosque and the other as a jawab, a structure to provide architectural symmetry. The mosque's design resembles others built during the era and the jawab has floors with inlaid patterns while lacking a mihrab



Mosque at the Taj Mahal complex in Agra, India



Taj Mahal has become a prominent image that is associated with India.

Construction

Taj Mahal

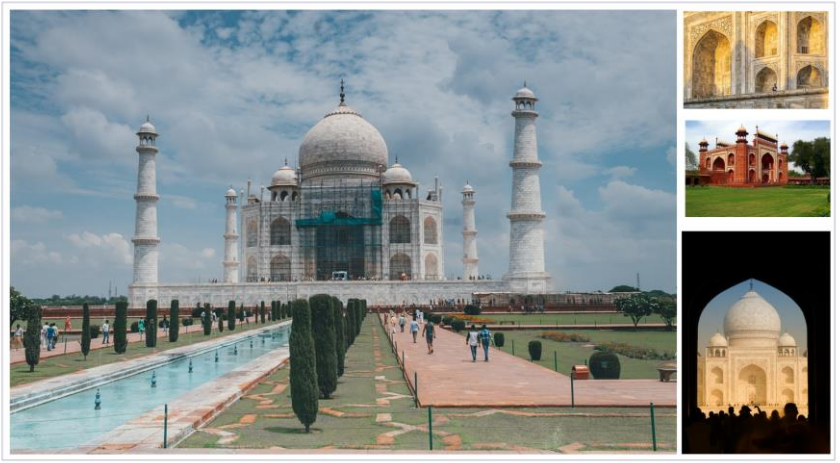
The land on which the Taj Mahal is situated was present to the south of the walled city of Agra which was given to Shah Jahan by Raja Jai Singh I in exchange for a large palace in the centre of Agra. The building was commissioned in 1631, and construction commenced in 1632. An area of roughly 1.2 hectares (3 acres) was excavated, filled with dirt to reduce seepage, and levelled at 50 metres (160 ft) above the riverbank level. In the tomb area, piles were dug and filled with lime and stone to form the footings of the tomb. The platform above the ground was constructed of brick and mortar.

The tomb complex was built mainly using brick and lime mortar. The external surface of the main tomb building and the interior of the main cenotaph chamber is veneered with white marble. The other interior surfaces and other accessory buildings are lined with red sandstone coated with a red octet for protection, excluding the exterior surfaces of domes. The white marble came from Makrana in Rajasthan, while the red sandstone was quarried from Fatehpur Sikri in Uttar Pradesh. Many precious and semi-precious stones, used for decoration, were imported from across the world, including jade and crystal from China, turquoise from Tibet, Lapis lazuli from Afghanistan, sapphire from Sri Lanka and carnelian from Arabia. In all, 28 types of precious and semi-precious stone were inlaid into the white marble.

It is believed that more than 20,000 artisans, labourers, painters and others were involved in the construction of the building. Specialist sculptors from Bukhara, calligraphers from Syria and Persia, designers from southern India, stone cutters from Baluchistan and Italian artisans were employed. Workmen constructed a colossal brick scaffold that mirrored the tomb rather than wooden scaffolds. A 15 km (9.3 mi) long earthern ramp was built to transport marble and materials to the construction site, hauled on specially constructed wagons by teams of oxen and elephants.[48] An elaborate post-and-beam pulley system was used to raise the blocks into the desired position. Water was drawn from the river by a series of an animal-powered devices.

Taj Mahal

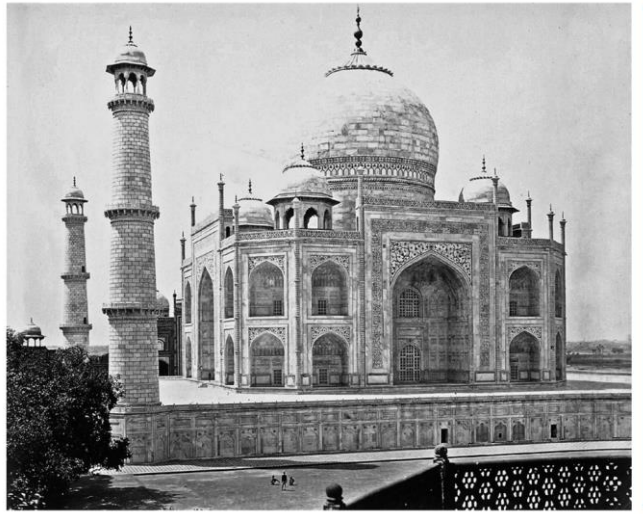
When the structure was partially completed, the first ceremony was held at the mausoleum by Shah Jahan on 6 February 1643, of the 12th anniversary of the death of Mumtaz Mahal. Construction of the mausoleum was completed in 1648, but work continued on other phases of the project for another five years. The Taj Mahal complex is believed to have been completed in its entirety in 1653 at a cost estimated at the time to be around ₹5 million, which in 2023 would be approximately ₹35 billion (US$77.8 million).



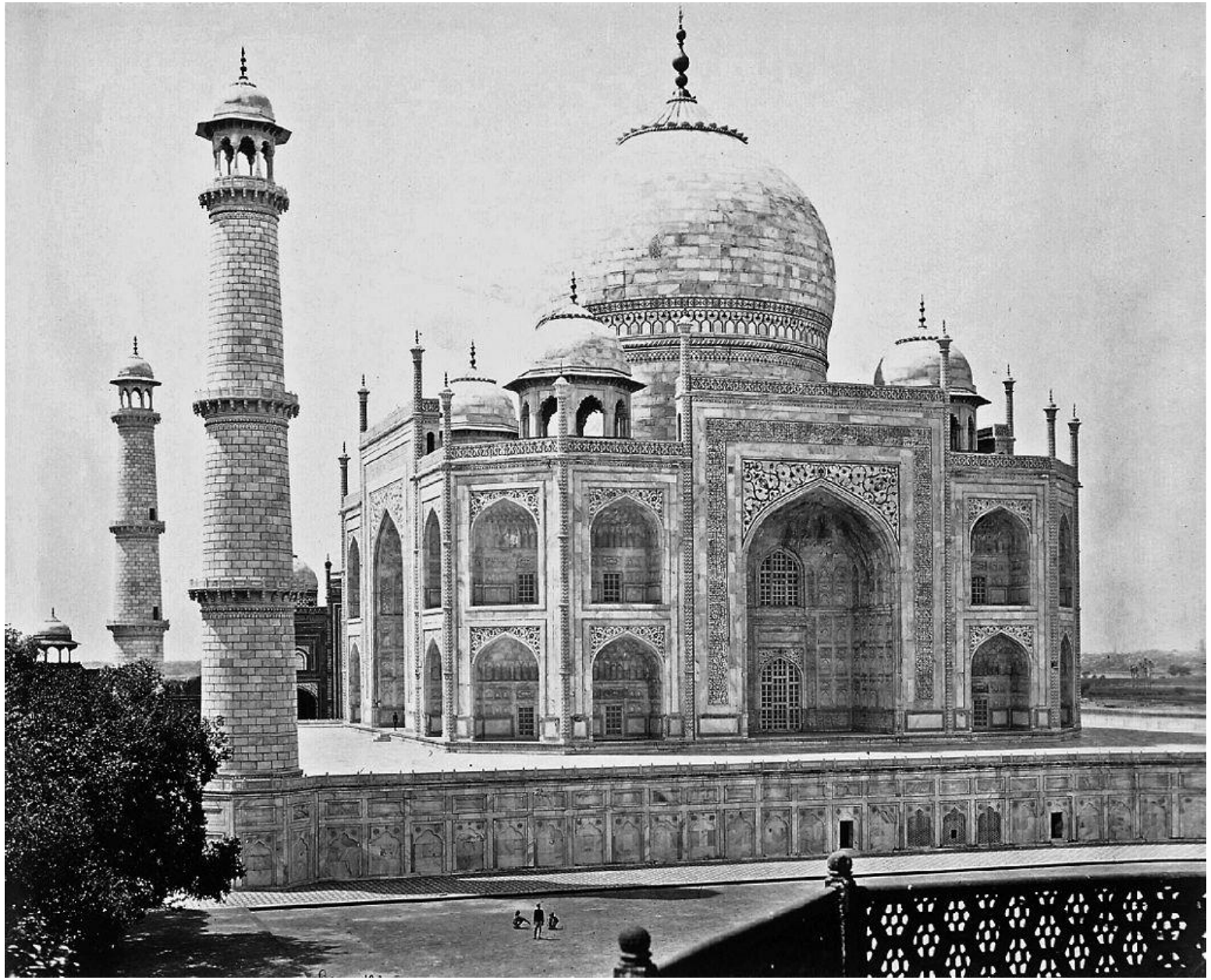
Taj Mahal

Taj Mahal

In December 1652, Shah Jahan's son Aurangzeb wrote a letter to his father about the tomb, the mosque and the assembly hall of the complex developing extensive leaks during the previous rainy season. In 1658, Shah Jahan was deposed by Aurangzeb and put under house arrest at the nearby Agra Fort from where he could see the Taj Mahal. Upon Shah Jahan's death in 1666, Aurangzeb buried him in the mausoleum next to his wife In the 18th century, the Jat rulers of Bharatpur attacked the Taj Mahal while invading Agra and took away two chandeliers, one of agate and another of silver, which had hung over the main cenotaph and the gold and silver screen. Kanbo, a Mughal historian, said the gold shield which covered the 4.6-metre-high (15 ft) finial at the top of the main dome was also removed during the Jat despoliation.



Year
1860



Year 1860

Taj Mahal

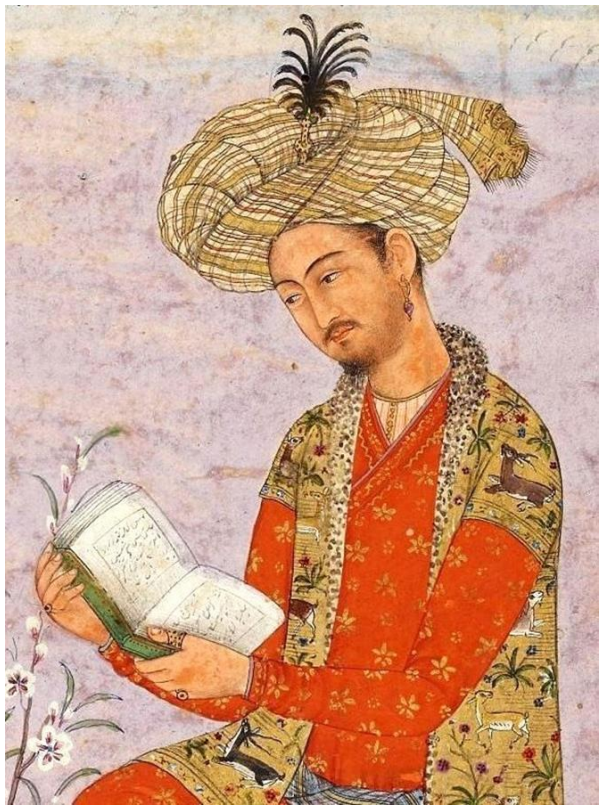
By the late 19th century, parts of the buildings had fallen into disrepair. At the end of the century, British viceroy Lord Curzon ordered a restoration project, which was completed in 1908. He also commissioned the large lamp in the interior chamber and replaced the gardens with European-style lawns that are still in place today.

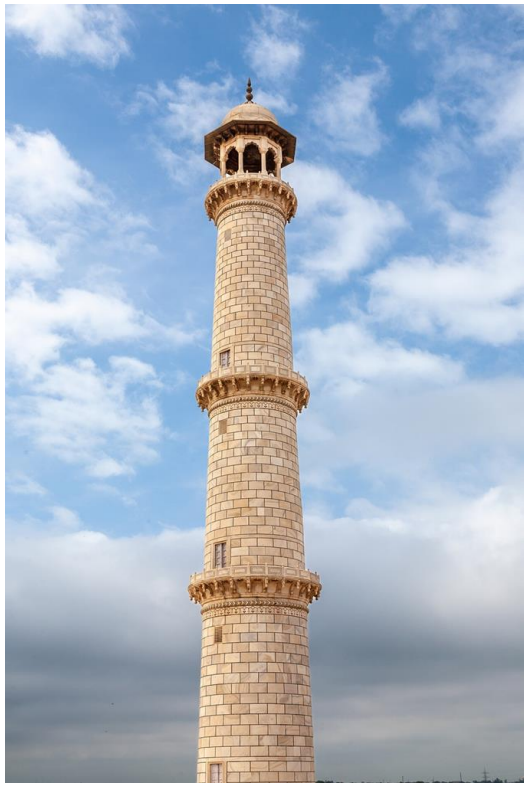
In 1942, the government erected scaffolding to disguise the building in anticipation of air attacks by the Japanese Air Force. Since Indian independence in 1947, the Archaeological Survey of India has been responsible for the maintenance of the monument. During the India-Pakistan wars of 1965 and 1971, scaffolding was again erected to mislead bomber pilots

In 1983, the Taj Mahal was designated as a UNESCO World Heritage Site for being "the jewel of Islamic art in India and one of the universally admired masterpieces of the world's heritage.

Since the late 20th century, the monument has been affected by environmental pollution which has turned the Taj Mahal yellow-brown. Acid rain and pollution affecting the Yamuna River including the presence of Mathura Oil Refinery, have contributed to the same. After directives by the Supreme Court of India, in 1997 the Indian government set up the "Taj Trapezium Zone (TTZ)", a 10,400-square-kilometre (4,000 sq mi) area around the monument where strict emissions standards are in place.

Agra Fort



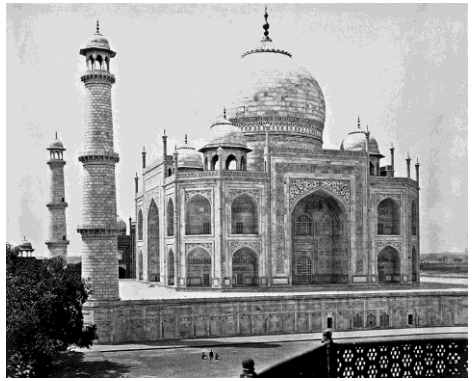


Taj Mahal

Due to the global attention that it has received and the millions of visitors it attracts, the Taj Mahal has become a prominent image that is associated with India, and in this way has become a symbol of India itself.

Along with being a renowned symbol of love, the Taj Mahal is also a symbol of Shah Jahan's wealth and power, and the fact that the empire had prospered under his rule. Bilateral symmetry, dominated by a central axis, has historically been used by rulers as a symbol of a ruling force that brings balance and harmony, and Shah Jahan applied that concept in the making of the Taj Mahal. Additionally, the plan is aligned in the cardinal north–south direction and the corners have been placed so that when seen from the centre of the plan, the sun can be seen rising and setting on the north and south corners on the summer and winter solstices respectively. This makes the Taj a symbolic horizon.

Taj Mahal has become a prominent image that is associated with India.



Taj Mahal

The planning and structure of the Taj Mahal, from the building itself to the gardens and beyond, is symbolic of Mumtaz Mahal's mansion in the garden of Paradise. The concept of gardens of paradise is extended into the building of the mausoleum as well. The structure is decorated with colorful relief and semi-precious stones using a technique called parchin kari, symbolizing grandeur. The building appears to slightly change colour depending on the time of day and the weather. The white marble reflects varying hues—pinkish in the morning, milky white during the day, golden in the moonlight, and sometimes even a bluish hue under certain lighting conditions. This effect is due to the marble's surface reacting to light and moisture, creating a magical and ever-changing visual experience. The sky has not only been incorporated in the design through the reflecting pools but also through the surface of the building itself. This is another way to imply the presence of Allah at the site.

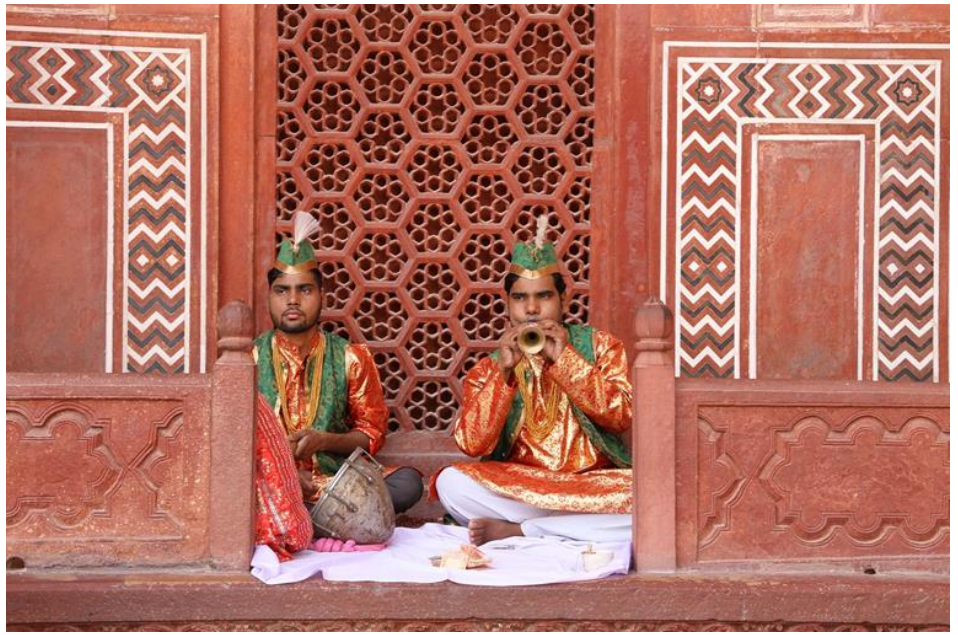
According to Ebba Koch, art historian and international expert in the understanding and interpretation of Mughal architecture and the Taj Mahal, the planning of the entire compound symbolises earthly life and the afterlife, a subset of the symbolisation of the divine. The plan was split into two – one half is the white marble mausoleum itself and the gardens, and the other half is the red sandstone side, meant for worldly markets. Only the mausoleum is white so as to represent the enlightenment, spirituality and faith of Mumtaz Mahal. Koch has deciphered that symbolic of Islamic teachings, the plan of the worldly side is a mirror image of the otherworldly side, and the grand gate in the middle represents the transition between the two worlds.

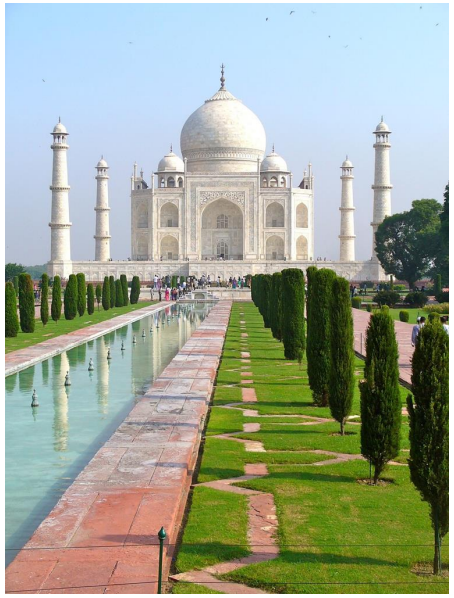
Tourism

Taj Mahal

The Taj Mahal is a major tourist attraction and attracts a large number of domestic and foreign visitors. About five million visitors visited Taj Mahal in the financial year 2022–23. A three-tier pricing system is in place, with a significantly lower entrance fee for Indian citizens and more expensive ones for foreigners. As of 2024, the fee for Indian citizens was ₹50, for citizens of SAARC and BIMSTEC countries, it was ₹540 and for other foreign tourists, it was ₹1,100. Visitors are allowed through three gates and as polluting vehicles are not allowed near the complex, tourists must either walk or take electric buses from the designated parking areas. The complex is open on all days except on Friday from one hour before sunrise to 45 minutes before sunset. The complex is open for limited night viewing on the day of the full moon, excluding the month of Ramadan. In 2019, to address overtourism, the site instituted fines for visitors who stayed longer than three hours.

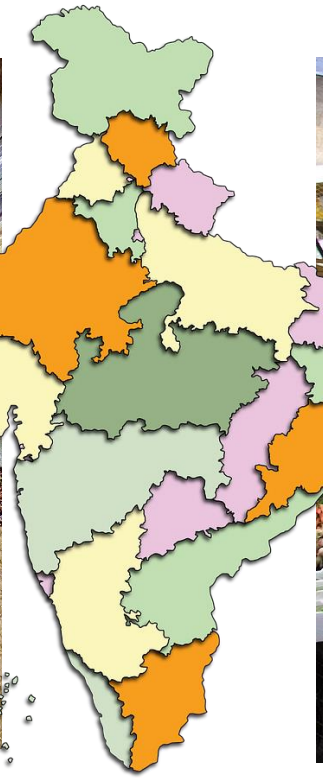
Visitors at the Taj Mahal





Taj Mahal

The small town to the south of the Taj, known as Taj Ganji or Mumtazabad, was initially constructed with caravanserais, bazaars and markets to serve the needs of visitors and workers. Lists of recommended travel destinations often feature the Taj Mahal, which also appears in several listings of seven wonders of the modern world, including the New Seven Wonders of the World, a poll conducted in 2007. Foreign dignitaries often visit the Taj Mahal on trips to India.



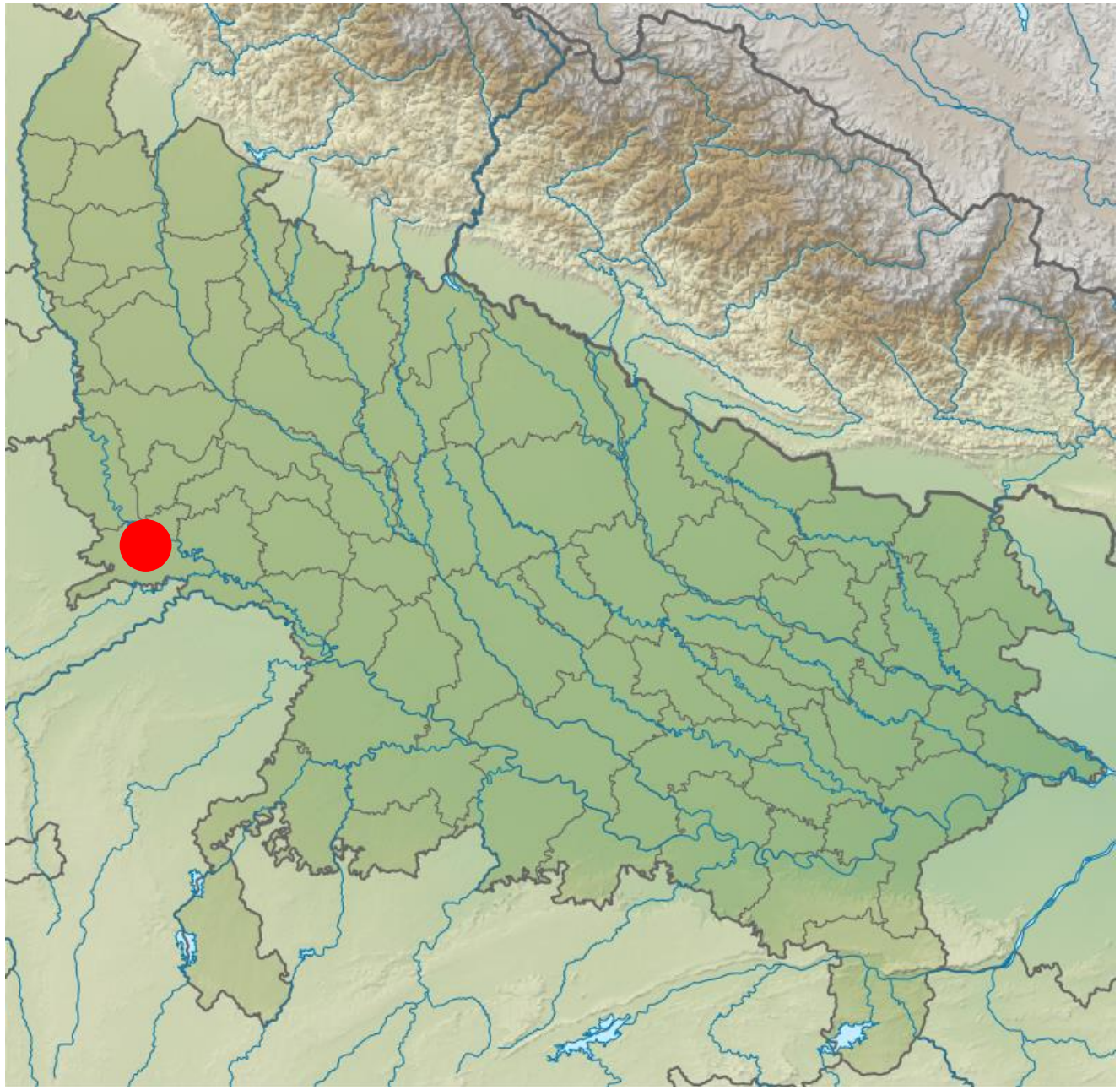
Agra

Agrais a city on the banks of the Yamuna river in the Indian state of Uttar Pradesh, about 230 kilometres (140 mi) south-east of the national capital Delhi and 330 km west of the state capital Lucknow. With a population of roughly 1.6 million, Agra is the fourth-most populous city in Uttar Pradesh and twenty-third most populous city in India.
Agra's notable historical period began during Sikandar Lodi's reign, but the golden age of the city began with the Mughals in the early 16th century. Agra was the foremost city of the Indian subcontinent and the capital of the Mughal Empire under Mughal emperors Babur, Humayun, Akbar, Jahangir and Shah Jahan. Under Mughal rule, Agra became a centre for learning, arts, commerce, and religion, and saw the construction of the Agra Fort, Sikandra and Agra's most prized monument, the Taj Mahal, constructed between 1632 and 1648 by Shah Jahan in remembrance of his wife Mumtaz Mahal. With the decline of the Mughal empire in the late 18th century, the city fell successively first to Marathas and later to the East India Company.

After Independence, Agra has developed into an industrial town, with a booming tourism industry, along with footwear, leather and other manufacturing. The Taj Mahal and the Agra Fort are UNESCO World Heritage Sites. The city features mild winters, hot and dry summers and a monsoon season, and is famous for its Mughlai cuisine. Agra is included on the Golden Triangle tourist circuit, along with Delhi and Jaipur; and the Uttar Pradesh Heritage Arc, a tourist circuit of Uttar Pradesh, along with Lucknow and Varanasi.

Agra Fort

Red Fort in Agra



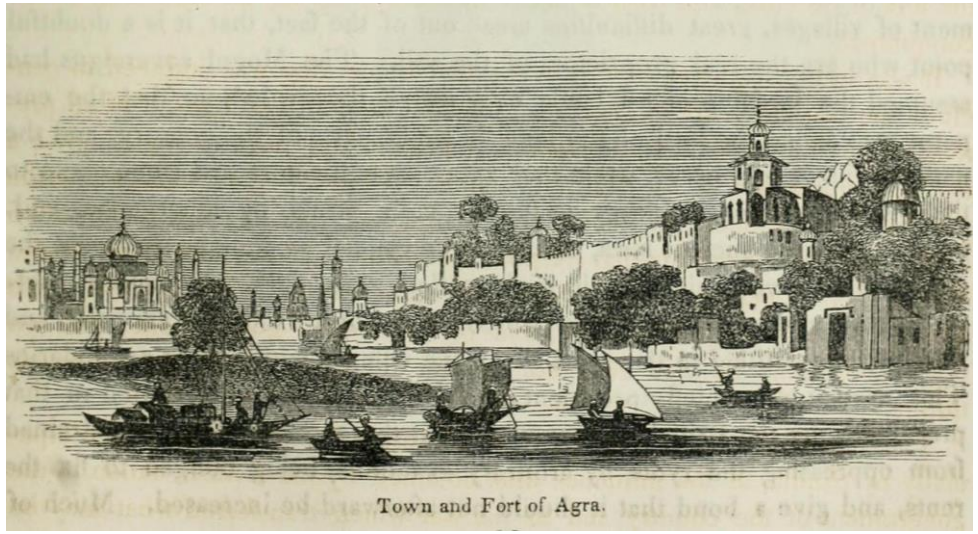
The name Agra is explained by different derivations, all of which have low verifiability. The most accepted one is that it had its origin from the Hindi word agar meaning salt-pan, a name which was given to it because the soil in the region is brackish and salt used to be made here once by evaporation. Others derive it from Hindu History claiming that the Sanskrit word agra which means the first of the many groves and little forests where Krishna frolicked with the gopis of Vrindavan. The term Agravana hence means grove forest.

Agra was also known as Akbarabad in the Mughal era. The name was coined by the emperor Shah Jahan, in honour of his grandfather Akbar.

Agra

Pre-Mughal era

Agra has two histories: one of the ancient city on the east, or left, bank of the river Yamuna, going back so far as to be lost in the legends of Krishna and Mahabharata and reestablished by Sikandar Lodhi in 1504–1505; the other of the modern city, founded by Akbar in 1558, on the right bank of the river which is associated with the Mughals, and known throughout the world as the city of the Taj. Of ancient Agra little now remains except few traces of the foundations. It was a place of importance under various Hindu dynasties previous to the Muslim invasions of India, but its history is unclear, and possess little historical interest. The 17th century chronicler named Abdullah said it was a village before the reign of Sikandar Lodi. The king of Mathura had used the Agra fort as a jail. The degradation in the status of the site was a result of the destruction brought upon it by Mahmud of Ghazni. Masud Sa'd Salman claims to have been there when Mahmud assaulted Agra, claiming the Raja Japal surrendered after seeing a nightmare. Mahmud however proceeds to pillage the city.



Town and Fort of Agra.

Agra

Agra's period of historical importance began during Sikandar Lodi's reign. In 1504–1505, Sultan Sikandar Lodi (reigned 1489–1517, the Afghan ruler of the Delhi Sultanate, rebuilt Agra and made it the seat of government. Sikandar Lodhi appointed a commission which inspected and surveyed both sides of the Yamuna from Delhi to Etawah and finally chose a place on the left bank, or the east side of the Yamuna, as the site for the city. Agra on the left bank of the Yamuna grew into a large flourishing town with royal presence, officials, merchants, scholars, theologians and artists. The city became one of the most important centres of Islamic learning in India. The sultan founded the village of Sikandra in the northern suburbs of the city and built there a Baradari of red sandstone in 1495, which was converted into a tomb by Jahangir, and now stands as the Tomb of Mariam-uz-Zamani, Akbar's empress.

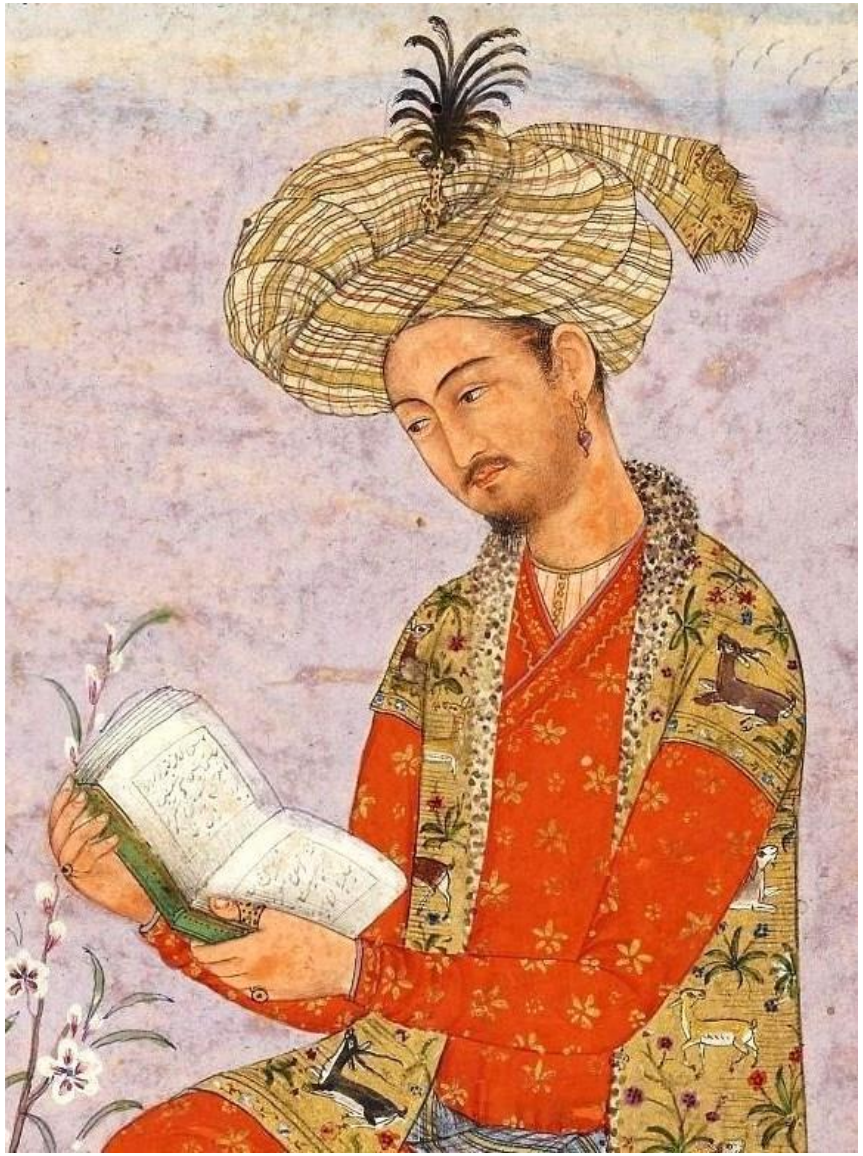
After the Sultan's death in 1517, the city passed on to his son, Sultan Ibrahim Lodi (reigned 1517–26. He ruled his sultanate from Agra until he was defeated and killed by Mughal Emperor Babur in the First battle of Panipat, fought in 1526.

The golden age of the city began with the Mughals. Agra was the foremost city of the subcontinent and the capital of the Mughal Empire until 1658, when Aurangzeb shifted the entire court to Delhi.[Babur (reigned 1526–30), the founder of the Mughal dynasty, acquired Agra after defeating the Lodhis and the Tomaras of Gwalior in the First Battle of Panipat in 1526. Babur's connection with Agra began immediately after the battle of Panipat.

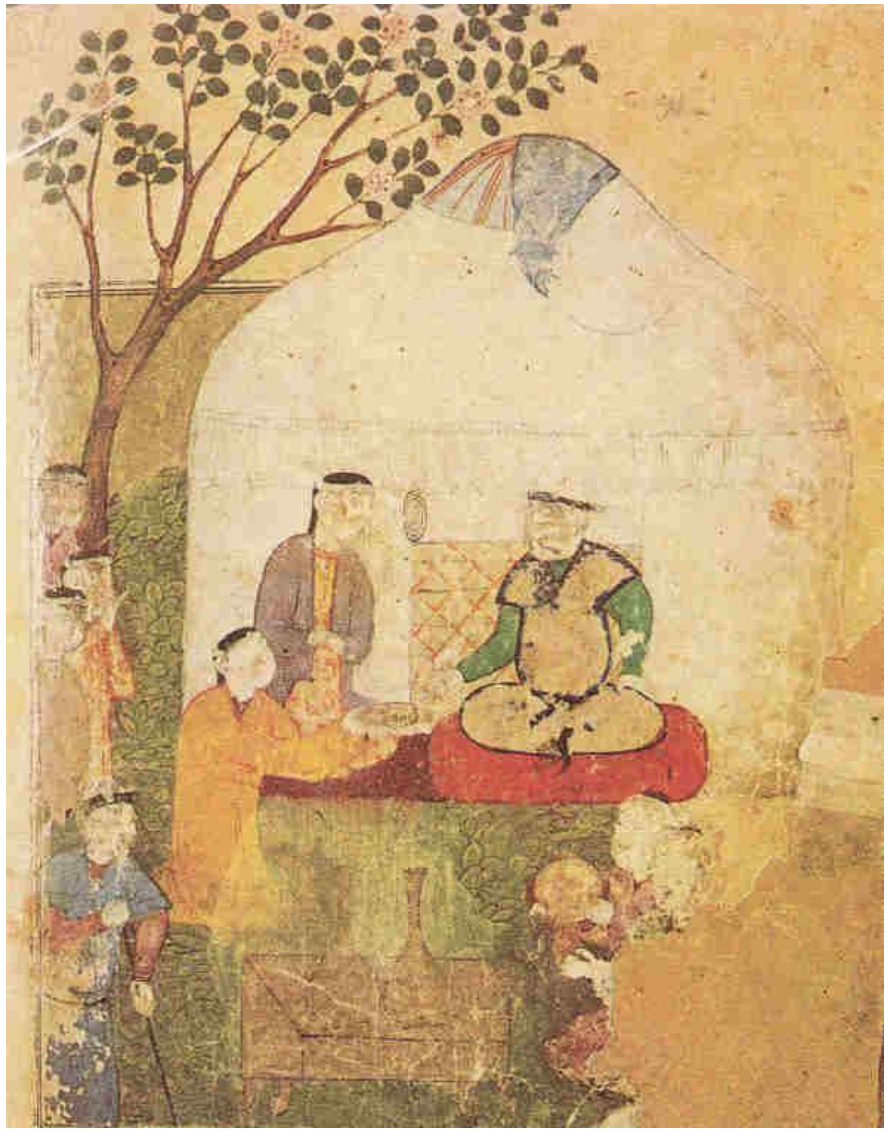
Agra

Babur 14 February 1483 – 26 December 1530; born Zahīr ud-Dīn Muhammad) was the founder of the Mughal Empire in the Indian subcontinent. He was a descendant of Timur and Genghis Khan through his father and mother respectively. He was also given the posthumous name of Firdaws Makani ('Dwelling in Paradise').

Born in Andijan in the Fergana Valley (now in Uzbekistan), Babur was the eldest son of Umar Shaikh Mirza II (1456–1494, governor of Fergana from 1469 to 1494) and a great-great-great-grandson of Timur (1336–1405). Babur ascended the throne of Fergana in its capital Akhsikath in 1494 at the age of twelve and faced rebellion. He conquered Samarkand two years later, only to lose Fergana soon after. In his attempt to reconquer Fergana, he lost control of Samarkand. In 1501, his attempt to recapture both the regions failed when the Uzbek prince Muhammad Shaybani defeated him and founded the Khanate of Bukhara. In 1504, he conquered Kabul, which was under the putative rule of Abdur Razaq Mirza, the infant heir of Ulugh Beg II.



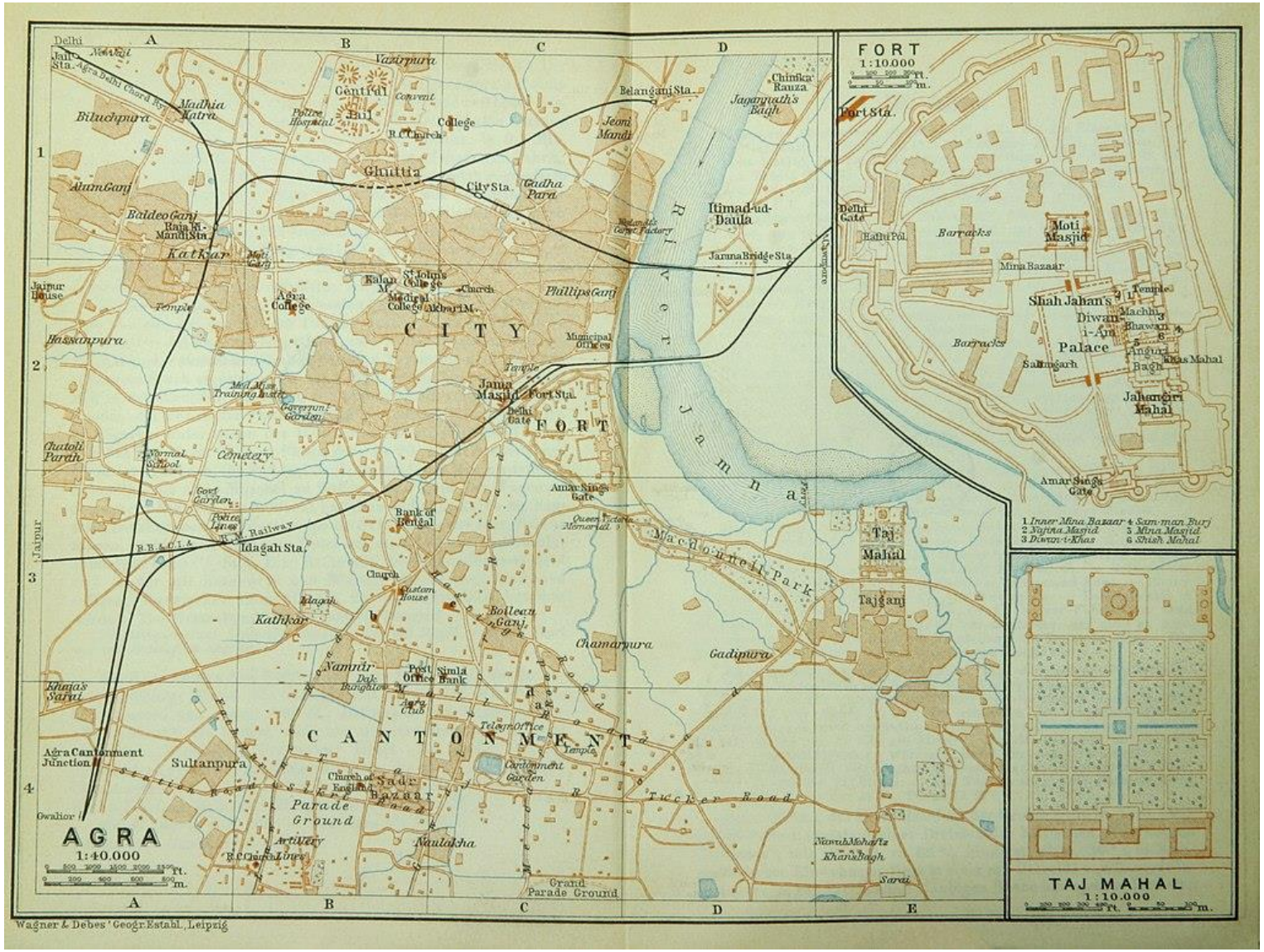
Agra



The Shibanids or Shaybanids,[a] more accurately known as the Abul-Khayrid-Shibanids, were a dynasty of Turko-Mongol origin who ruled over most of modern-day Kazakhstan, Uzbekistan, and parts of Russia (including West Siberia) in the 15th century. They were the patrilineal descendants of Shiban, the fifth son of Jochi and grandson of Genghis Khan. Until the mid-14th century, they acknowledged the authority of the descendants of Shiban's brothers Batu Khan and Orda Khan, such as Öz Beg Khan. The Shaybanids originally led the Gray Horde southeast of the Urals (also known as the Uzbegs, after the Uzbeks), and converted to Islam in 1282. At its height, the Khanate included parts of modern-day Afghanistan and other parts of Central Asia. As the lineages of Batu and Orda died out in the course of the great civil wars of the 14th century, the Shaybanids under Abu'l-Khayr Khan declared themselves the only legitimate successors to Jochi and put forward claims to the whole of his enormous ulus, which included parts of Siberia and Kazakhstan.

The trellis-walled yurt of Shaybani Khan, probably at Samarkand

Agra



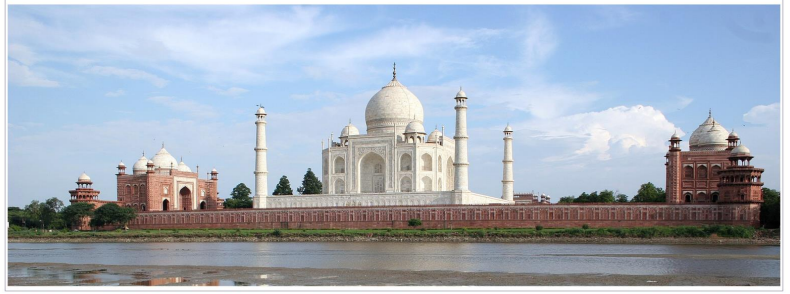
Map of the city, c. 1914

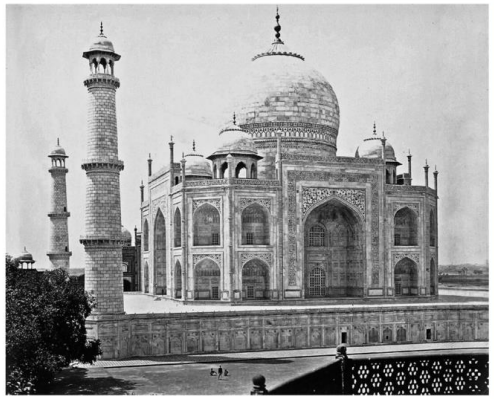
The decline of the Mughal empire caused the emergence of several regional kingdoms, and in the late 18th century the control of the city fell successively to the Jats, the Marathas, the Mughals, the ruler of Gwalior, and finally the British East India Company.

Agra

Post India's independence, Agra has been a part of Uttar Pradesh and has gradually developed into an industrial city, with a significant contribution to Uttar Pradesh's economy. The city is now a popular tourist destination and hosts tourists from across the world. The Taj Mahal and Agra Fort received UNESCO World Heritage Sites status in 1983. The Taj Mahal witnesses tourists, photographers, historians and archaeologists in massive numbers all around the year. The Taj Mahal has become a symbol of India.[Post Independence, Taj Mahal has been visited by world leaders like US Presidents Dwight D. Eisenhower (1959), Bill Clinton (2000), and Donald Trump (2020). Queen Elizabeth II of the United Kingdom had visited Taj Mahal in 1961 on her India visit. Taj Mahal has also been visited by Russian President Vladimir Putin (1999), Chinese President Hu Jintao (2006), Israeli Prime Minister Benjamin Netanyahu (2018) and Canadian Prime Minister Justin Trudeau (2018). Agra is the birthplace of the now extinct religion known as Din-i-Ilahi, which was founded by Akbar and also of the Radhaswami Faith, which has around two million followers worldwide. Agra is included on the Golden Triangle tourist circuit, along with Delhi and Jaipur and the Uttar Pradesh Heritage Arc, a tourist circuit of Uttar Pradesh, along with Lucknow and Varanasi.

Taj Mahal





Year
1860

Agra

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